City of Shishmaref, Alaska

Local Hazard Mitigation Plan

October 2009

Prepared by:

City of Shishmaref

WHPacific

and

Bechtol Planning and Development

Acknowledgements

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Photography

All Photography provided by the Shishmaref Community

The preparation of this plan was financed by funds from a grant from the Alaska State Division of Homeland Security and the Federal Emergency Management Agency.

U.S. Department of Homeland Security
Region X
130 228th Street. SW
Bothell, WA 98021-9796

FEMA

February 16, 2010

Honorable Howard P. Weyiouanna
Mayor, City of Shishmaref
P.O. Box 83
Shishmaref, Alaska 99772

Dear Mayor Weyiouanna:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***City of Shishmaref, Alaska Multi-Hazard Mitigation Plan*** as a local plan as outlined in 44 CFR Part 201. With approval of this plan, the city of Shishmaref is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through February 16, 2015.

The plan's approval provides eligibility to apply for hazard mitigation projects through your State. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your community to follow the plan's schedule for its monitoring and updating, and to develop further mitigation actions. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact our State counterpart, Alaska Division of Homeland Security and Emergency Management, which coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey

Mark Carey, Director
Mitigation Division

cc: Mark Roberts, Alaska Division of Homeland Security and Emergency Management

Enclosure

BH:bb

www.fema.gov

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Acronyms

ADOT/PF	Alaska Department of Transportation and Public Facilities
AEIS	Alaska Earthquake Information System
AWCG	Alaska Wildfire Coordinating Group
BCA	Benefit- Cost Analysis
BCR	Benefit-Cost Review
BFE	Base Flood Elevation (100 year flood)
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CMP	Coastal Management Plan
DCCED	(Alaska) Department of Commerce, Community and Economic Development
DCRA	(Alaska) Division of Community and Regional Affairs
DHS&EM	(Alaska) Division of Homeland Security and Emergency Management
FBFM	Flood Boundary and Floodway Maps
FDIC	Federal Deposit Insurance Corporation
FEMA	Federal Emergency Management Agency
FHLBB	Federal Home Loan Bank Board
FIRM	Flood Insurance Rate Maps
FLD	Flood Projects
fps	feet per second
FLD	Flood Projects
HMP	Hazard Mitigation Plan
HMPG	Hazard Mitigation Planning Grant
IAWG	Immediate Action Workgroup
MHMP	Local Multi-Hazard Mitigation Plan
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
PDM	Pre Disaster Mitigation Program
SBA	Small Business Administration
STIP	Statewide Transportation Improvement Program
T/S	Tsunami/Seiche Projects
USCOE	United States Army Corps of Engineers
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

Signed Resolution

City of Shishmaref
P.O. Box 83
Shishmaref, Ak 99772

Local Hazard Mitigation Plan Adoption Resolution

Resolution # 10-04

Adoption of the City of Shishmaref Local Hazards Mitigation Plan

Whereas, the City of Shishmaref recognizes the threat that local natural hazards pose to people and property; and

Whereas, undertaking hazard mitigation projects before disasters occur will reduce the potential for harm to people and property to save taxpayer dollars; and

Whereas, an adopted Local Hazards Mitigation Plan is required as a condition of future grant funding for mitigation projects; and

Whereas, the Shishmaref Local Hazards Mitigation Plan has been sent to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for their approval;

Now, therefore, be it resolved, that the City of Shishmaref will submit the adopted Local Hazards Mitigation Plan to the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency officials for final review and approval.

PASSED AND APPROVED BY THE SHISHMAREF CITY COUNCIL ON January 21, 2010
By a vote of: 6 yes, 0 no, 0 abstain, 1 absent

IN WITNESS THERETO:

BY: Howard P. Weyiouanna Sr
Howard P. Weyiouanna, Mayor

Attest: Melanie Weyiouanna
Melanie Weyiouanna, City Clerk

Chapter 1. Planning Process and Methodology

Introduction

Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. (FEMA 386-8)

Local Mitigation Plan regulations are found in the Code of Federal Regulations at 44 CFR Part 201. This plan has been developed using the regulations to ensure compliance with federal criteria.

Federal regulations specify that local mitigation plans be designed to help jurisdictions identify specific actions to reduce loss of life and property from natural hazards. They are not intended to help jurisdictions establish procedures to respond to disasters or to write an emergency operations plan. The goal of mitigation is to decrease the need for response as opposed to increasing response capability. (FEMA 386-8)

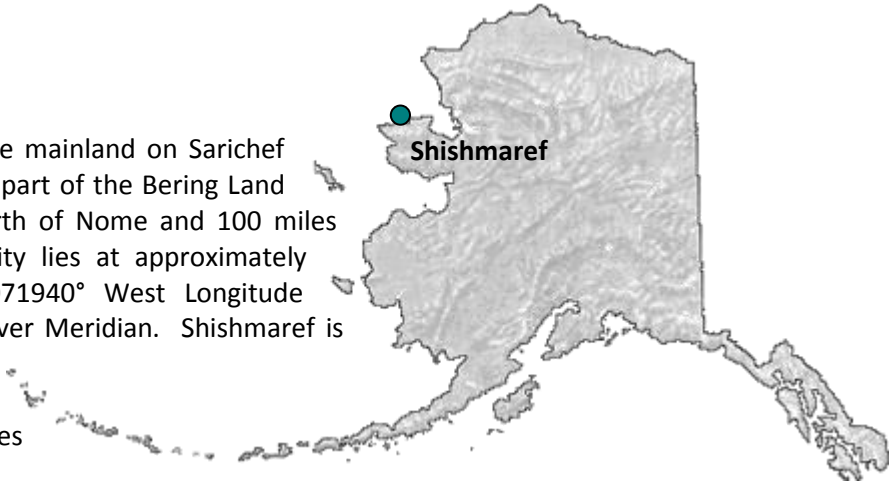
The scope of this plan is natural hazards present in the community: flooding, erosion, severe weather, and earthquake hazards. However, some of the mitigation projects for natural hazards would also mitigate impacts from other hazards, such as technological and economic hazards.

The City of Shishmaref local Multi-Hazard Mitigation Plan (MHMP) includes information to assist the city government and residents with planning to avoid future disaster losses. The plan provides information on natural hazards that affect Shishmaref, describes past disasters, and lists projects that may help the community prevent disaster losses. The plan was developed to help the City make decisions regarding natural hazards that affect Shishmaref.

Plan Development

Location

Shishmaref is located five miles from the mainland on Sarichef Island, in the Chukchi Sea. Shishmaref is part of the Bering Land Bridge National Preserve; 126 miles north of Nome and 100 miles southwest of Kotzebue. The community lies at approximately 66.256670° North Latitude and -166.071940° West Longitude and Sector 23, T010N, R035W, Kateel River Meridian. Shishmaref is located in the Cape Nome Recording District. Shishmaref encompasses 2.8 square miles of land and 4.5 square miles of water.



Project Staff

The Shishmaref City Council, under, Howard Weyiouanna Sr., mayor, had project oversight. Others who assisted with the project included the Native Village Council under, Karla Nayokpuk, Tribal President.

WHPacific and Bechtol Planning & Development were hired to write the plan with the City. Ervin Petty, Mark Roberts, and Andy Jones of the Division of Homeland Security & Emergency Management (DHS&EM) provided technical assistance and reviewed the drafts of this plan.

Plan Research

The plan was developed from existing Shishmaref plans and studies as well as outside information and research. The following list contains the most significant of the plans, studies, and websites that were used in preparing this document. Additional sources are listed in the bibliography.

1. *Alaska All-Hazard Risk Mitigation Plan*. Prepared by and for DHS&EM. October 2007
2. *Division of Community and Regional Affairs (DCRA) Community Information*: http://www.commerce.state.ak.us/dca/commdb/CF_BOCK.htm.
3. *It's a Disaster! And what are you gonna do about it?* Prepared by the Immediate Action Workgroup, March 4, 2008
4. FEMA How to Guides:
    a. *Getting Started: Building Support For Mitigation Planning (FEMA 386-1)*
    b. *Local Multi-Hazard Mitigation Planning Guidance, July 1, 2008 (FEMA 386-8)*
    c. *Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)*
    d. *Developing The Mitigation Plan: Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)*
    e. *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)*
    f. *Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)*
5. University of Alaska, Fairbanks, and Alaska Earthquake Information Center website at: http://www.giseis.alaska.edu/Seis/
6. USGS Earthquake Probability Mapping: www//eqint.cr.usgs.gov/eqprob/2002/index.php
7. West Coast and Alaska Tsunami Warning Center, NOAA, http://wcatwc.arh.noaa.gov/

General Hazard Planning Web Sites

American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	http://www.pro.gov.uk
Federal Emergency Management Agency:	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm
Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm

Hazard Mitigation Grant Program: http://www.fema.gov/fima/hmgp
Individual Assistance Programs: http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule: http://www.access.gpo.govl
National Flood Insurance Program: http://www.fema.gov/nfip
Public Assistance Program: http://www.fema.gov/rrr/pa

Public Involvement

Public meetings were held on Tuesday, August 5, 2008 and Wednesday, May 13, 2009. Attendance included representatives of the City and Tribe, as well as public safety volunteers and other interested parties.

Prior to the meeting, a newsletter was distributed and posted throughout the community. The meeting sign in sheet and newsletter are contained in the public involvement appendix.

The draft MHMP was submitted to the City and Tribe for review in May 13, 2009. Comments were incorporated into the document.

A copy of the draft MHMP is available for public perusal at the City and Tribal Government Offices.

The Shishmaref City Council will review and approve the plan after pre-approval by DHS&EM and FEMA.

Plan Implementation

The City Council of Shishmaref will be responsible for adopting the Shishmaref MHMP and all future updates or changes. This governing body has the authority to promote sound public policy regarding hazards. The MHMP will be assimilated into other Shishmaref plans and documents as they come up for review according to each plan's review schedule.

Table 1. Shishmaref Planning Documents

Document	Completed	Scheduled Review
Recommendations to the Governor's Subcabinet on Climate Change	2009	
Local Economic Development Plan	2003	2009
Local Economic Development Plan	2003	2009
Section 117 Shoreline Erosion Protection	2006	
Shishmaref Traditional Industries Inc. Into the 21st Century A Plan for Growth and Expansion	1998	
Shishmaref Water and Sewer Feasibility Study	1998	
Ponds as Potable Water Sources	1980	
Water, Wastewater and Solid Waste Haul System Feasibility Study	1979	
Shishmaref Expansion and Relocation Study	1978	

Document	Completed	Scheduled Review
Shishmaref Various Letters and Soils Report	1975	
Shishmaref Erosion Protection, Alternatives Feasibility and Cost Study	1975	
Background Information on the Shishmaref Relocation Effort	1974	

Monitoring, Evaluating and Updating the Plan

Section §201.6(c)(4)(i) of the mitigation planning regulation requires that the plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Monitoring the Plan

The Shishmaref Council, Mayor, or their designees are responsible for monitoring the plan. On an annual basis the Administration will seek a report from the agencies and departments responsible for implementing the mitigation projects in Chapter 4 of the plan. The compiled report will be provided to the City Council as information and noticed to the public. Public comments will be sought. A report outlining all five years of the plan monitoring will be included in the plan update.

Evaluating the Plan

The Shishmaref City Clerk or designee will evaluate the plan during the five-year cycle of the plan. On an annual basis, concurrent with the report above, the evaluation should assess whether:

- The goals and objectives address current and expected conditions.
- The nature, magnitude and/or types of risks have changed.
- The current resources are appropriate for implementing the mitigation projects in Chapter 4.
- There are implementation problems, such as technical, political, legal or coordination issues with other agencies.
- The outcomes have occurred as expected (a demonstration of progress).
- The agencies and other partners participated as originally proposed.

Updating the Plan

The mitigation planning regulations at §201.6(d)(3) direct the update of Mitigation Plans.

Plans must be updated and resubmitted to FEMA for approval every five years in order to continue eligibility for FEMA hazard mitigation assistance programs. Plan updates must demonstrate that

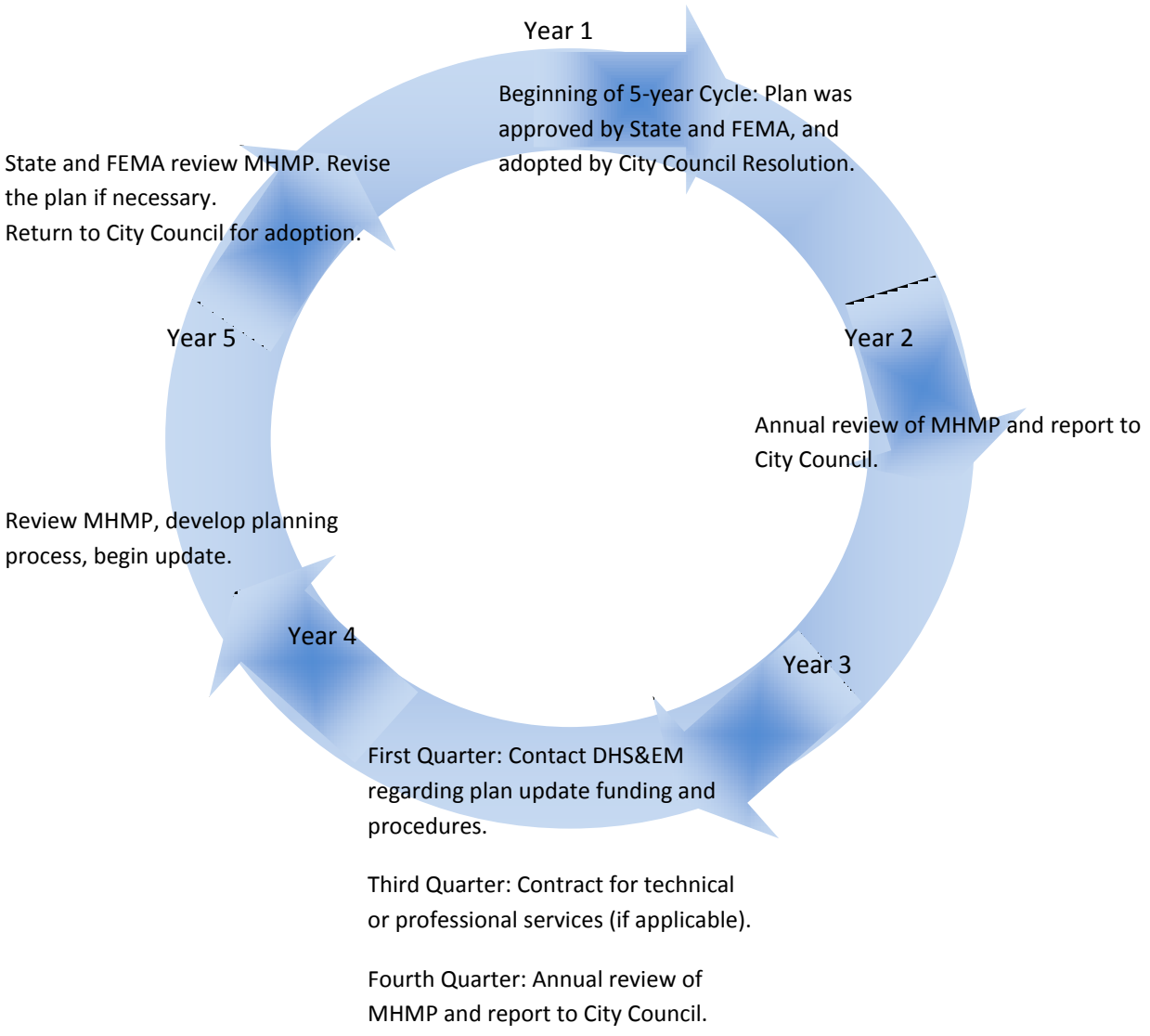
progress has been made in the past five years to fulfill commitments outlined in the previously approved plan. This involves a comprehensive review and update of each section of the plan and a discussion of the results of evaluation and monitoring activities described above. Plan updates may validate the information in the previously approved plan or may involve a major plan rewrite. A plan update may not be an annex to this plan; it must stand on its own as a complete and current plan.

The tasks required to monitor, evaluate and update the MHMP are illustrated in Figure 1.

Continued Public Involvement

A copy of the MHMP will be kept at City and Tribal offices and will be available for public review. On an annual basis the City Council will review the plan, which will be advertised to the public using the same methods established in the public involvement section of this plan.

Figure 1. Hazard Mitigation Planning Cycle



Chapter 2. Community Profile

Community Overview

Current Population: 587 (2008 DCRA Certified Population)
Pronunciation: SHISH-muh-reff
Incorporation Type: Second Class City
Borough: Unorganized
Census Area: Nome

Table 2 provides local and regional contact information for Shishmaref.

Table 2. Shishmaref Community Information

Community Information	Contact Information and Type
City of Shishmaref	City of Shishmaref P.O. Box 83 Shishmaref, AK 99772 Phone: (907) 649-3781 Fax: (907) 649-2131
Borough	Unorganized
Village Corporation	Shishmaref Native Corporation General Delivery Shishmaref, AK 99772 Phone: (907) 649-3751 Fax: (907) 649-3731
Electric Utility	Alaska Village Electric Cooperative, Inc. (AVEC) 4831 Eagle St. Anchorage, Alaska, 99503 (907) 561-1818 Web: www.avec.org
Village Council	Native Village of Shishmaref P.O. Box 72110 Shishmaref, AK 99772 Phone: 907-649-3821 Fax: 907-649-2104

Community Information	Contact Information and Type
Regional Native Corporation	Bering Straits Native Corp. P.O. Box 1008 Nome, AK 99762 Phone: 907-443-5252 Fax: 907-443-2985 Web: http://www.beringstraits.com
Regional Native Non-Profit	Kawerak, Incorporated P.O. Box 948 Nome, AK 99762 Phone: 907-443-5231 Fax: 907-443-4452 E-Mail: webmaster@kawerak.org Web: http://www.kawerak.org
School District	Bering Straits Schools P.O. Box 225 Unalakleet, AK 99684 Phone: 907-624-3611 Fax: 907-624-3078 E-Mail: JHickerson@bssd.org Web: http://www.bssd.org

History

Iñupiat Eskimos inhabited Sarichef Island for several centuries prior to the arrival of western culture. The Iñupiat population called their village “Kigiktaq;” the name “Shishmaref” was the name of a crewmember of Lt. Otto Von Kotzebue, who in 1861 named the inlet surrounding the island “Shishmarev”. The harbor in Shishmaref became central to the gold mining supply chain in the early 1900s. By 1901, the first Post Office was established and by the 1920s the BIA opened the first school. The City of Shishmaref was incorporated as a Class 2 city in 1969. During a storm in October 1997, 30 feet of the north shore was eroded. As a result 14 homes and the National Guard Armory were forced to relocate. After additional storms forced the relocation of five other homes the community voted in July 2002, to relocate the entire community. Currently, Shishmaref relocation is being examined by the Governor’s Climate Change Sub-Cabinet Immediate Action Work Group (IAWG). The IAWG is working to provide early assessment and development of an action plan addressing climate change impacts on coastal and other vulnerable communities in Alaska.

Culture

Shishmaref has a significant Iñupiat Eskimo population. Subsistence hunting and fishing are central to the community's culture. Approximately 88,216 pounds of fish (salmon, herring, smelt, etc) and 224,977

pounds of seal were harvested by Shishmaref residents; 157 and 401 pounds per capita respectively (Alaska Department of Fish and Game, 1995).

Population

The population of the community is 94.5 percent Alaska Native or part Native; primarily Iñupiat Eskimos with a subsistence lifestyle. During the 2000 U.S. Census, total housing units numbered 148, and vacant housing units numbered 6, four of which were vacant due to seasonal use.

Economy

Shishmaref's economy is supplemented by part-time work but mainly consists of subsistence activities. Two residents hold a commercial fishing permit. U.S. Census data for Year 2000 showed 173 residents as employed. The unemployment rate at that time was 16.4 percent, although 42.3 percent of all adults were not in the work force. The median household income was $30,714, per capita income was $10,487, and 16.3 percent of residents were living below the poverty level.

Facilities

Shishmaref's main water supply is a catch basin on the east side of the island. The water is filtered, chlorinated and stored in two new tanks. The City operates a delivery service for the 80 percent of residents without plumbed housing. The city also operates three lagoons and provides honeybucket hauling.

The City operates a Class 3 non-permitted landfill. An old landfill on the north side of the island is being washed out to sea due to erosion. The electric utility, Alaska Village Electric Cooperative (AVEC), in co-operation with the City operates a 971-kilowatt capacity diesel generator.

The Shishmaref K-12 school, part of the Bering Straits School District, is attended by 173 students and has a staff of 41. The Bering Straits School District's 15 schools have an 87 percent graduation rate. The clinic is staffed by a health aid who also provides emergency services. Residents in need of more extensive services may also be medevaced to Nome.

Transportation

A State-owned 5,000-foot-long by 70-foot-wide paved runway provides access to Shishmaref. Scheduled, charter, and freight flights use the airport. Small boats are also commonly used to access the island from the mainland. During the winter months, travel via snowmachine is also possible between the island and mainland. The nearest hub communities are Nome, which offers regular aircraft service to and from the village, and Kotzebue. The ADOT/PF has been approved to perform a relocation road reconnaissance assessment for a road connecting the island to the mainland. The road would be used as an evacuation route and may ease the relocation process.

Climate

Winter temperatures average from -12 to 2 degrees Fahrenheit. Summer temperatures average from 47 to 54 degrees Fahrenheit. Annual precipitation is 8 inches, and average snowfall is 33 inches. See Section 5. Severe Weatherfor more detailed information on Shishmaref's climate.

Vegetation and Soil

Shishmaref is located on a barrier island composed of sand soils. Permafrost encompasses the entire island. Shishmaref has exceptional berry patches.

Wildlife

Ringed, ribbon, bearded and spotted seals and walrus can be found 40-70 mile off-shore. Herring, tomcod, whitefish, grayling, Arctic char, flounder, salmon and sculpin are fish found closer in; along with waterfowl. Large land mammals are not found on the island.

Shishmaref Capability Assessment

Government

The City Council of Shishmaref consists of one mayor and seven council members, elected by the residents of Shishmaref. City elections are held on the first Tuesday in October and each council member serves a three-year term. The City Council meets twice a month on the first and third Tuesday.

Community Maps

Community maps were developed using data from the DCRA website, Flood Insurance Rate Maps (FIRM) and input from residents. Map 1 provides a regional view of Shishmaref.

Infrastructure

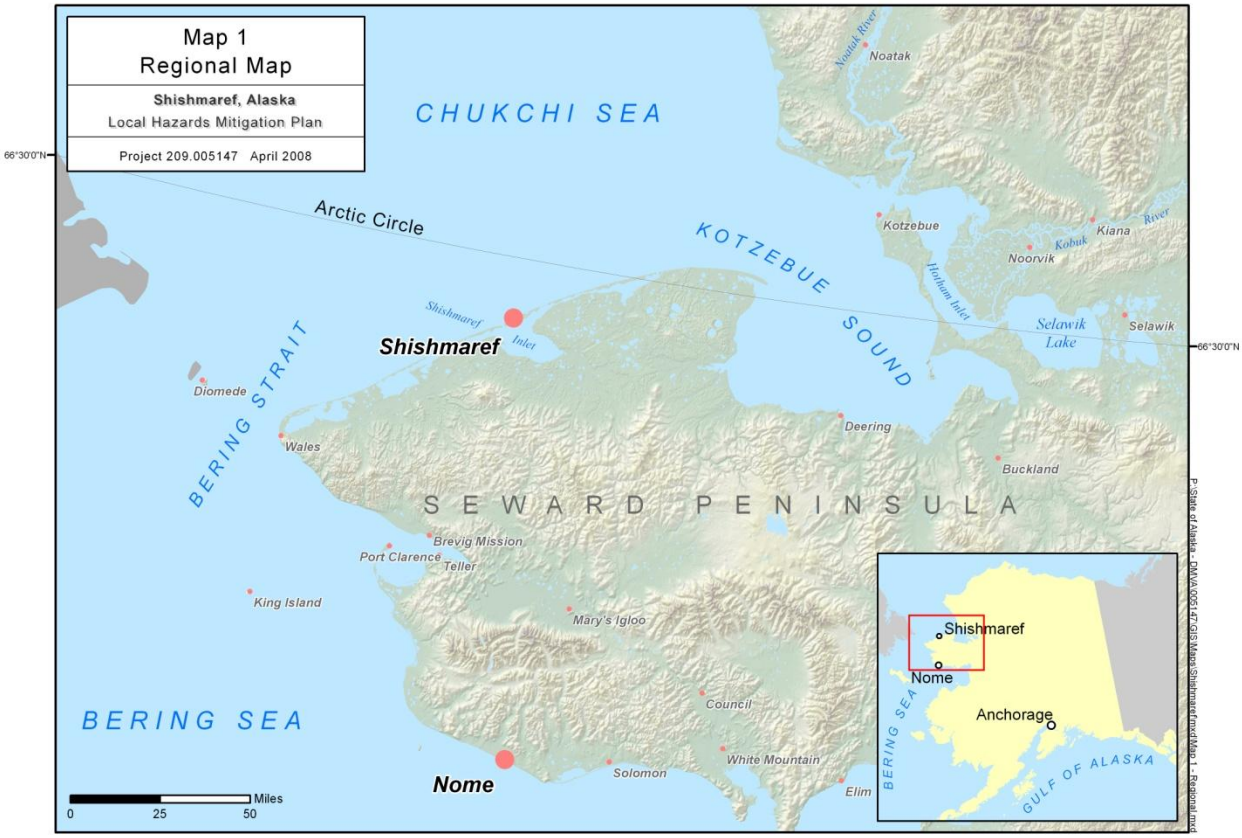
The list of assets that are most important to protect, as well as the criticality of any given facility, can vary widely from community to community. For planning purposes, a jurisdiction should determine criticality based on the relative importance of its various assets for the delivery of vital services, the protection of special populations, and other important functions. Infrastructure may be considered critical for a variety of reasons. Examples of these types of facilities are listed below and shown in Map 2. Critical Facilities and Infrastructure.

Critical Facilities

Critical facilities are those facilities and infrastructure necessary for emergency response efforts and whose loss of function would present an immediate threat to life, public health, and safety. In Shishmaref, they include:

- Landing Strip
- Katherine Miksruaq Olanna Health Clinic
- Public Works Garage
- Public Utilities

Map 1. Regional Map



Essential Facilities

Essential facilities are those facilities and infrastructure that supplement response efforts and whose loss of function would present an immediate threat to life, public health, and safety, including:

- Designated Shelters – Church
- Bulk Fuel Storage Tank Farms
- Washeteria
- Power Plant
- General and Native Stores

Critical Infrastructure

Critical infrastructure consists of the various service networks in Shishmaref, including:

- Communication Networks
- Power Lines
- Transportation Networks
- Water and Wastewater Facilities

Vulnerable Populations

Locations within Shishmaref that serve populations with special needs or requiring special consideration include:

- School
- Katherine Miksruaq Olanna Health Clinic

Cultural and Historical Assets

Cultural and historical assets include those facilities that augment or help define community character that, if lost, would represent a significant loss to the community. These include:

- Shishmaref Church
- Shishmaref Cemetery
- Friendship Center

Map 2. Critical Facilities and Infrastructure

Federal Resources

The federal government requires local governments to have a hazard mitigation plan in place to be eligible for funding opportunities through FEMA, such as through the Pre-Disaster Mitigation Assistance Program (PDM) and the Hazard Mitigation Grant Program (HMGP). The Mitigation Technical Assistance Programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from the FEMA Publication Warehouse (1-800-480-2520) and are briefly described below:

- **How-to Guides.** FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides mirror the four major phases of hazard mitigation planning used in the development of the Shishmaref Hazard Mitigation Plan. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting Disaster Mitigation Act (DMA) 2000 requirements (http://www.fema.gov/fima/planhowto.shtm).

- **Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments.** FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.

- **Mitigation Resources for Success CD.** FEMA 372, September 2001. This CD is useful for state and local government planners and others. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.

- **A Guide to Federal Aid in Disasters.** FEMA 262, April 1995. When disasters exceed the capabilities of state and local governments, the President's disaster assistance program (administered by FEMA) is the primary source of federal assistance. This handbook discusses the procedures and processes for obtaining this assistance, and provides a brief overview of each program.

- **The Emergency Management Guide for Business and Industry.** FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to Shishmaref businesses.

Other Federal Resources Include:

- **Department of Agriculture.** Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.

- **Department of Energy, Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program.** This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.

- **Department of Housing and Urban Development, Office of Homes and Communities, Section 108 Loan Guarantee Programs.** This program provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.

- **Department of Housing and Urban Development, Community Development Block Grants.** Administered by the Alaska Department of Commerce, Community and Economic Development (DCCED) DCRA. Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.

- **Department of Labor, Employment and Training Administration, Disaster Unemployment Assistance.** Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

- **Federal Financial Institutions.** Member banks of the Federal Deposit Insurance Corporation (FDIC) or Federal Home Loan Bank Board (FHLBB) may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

- **Internal Revenue Service, Tax Relief.** Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to three years.

- **United States Small Business Administration (SBA).** May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to the Alaska DHS&EM.

The following are websites that provide focused access to valuable planning resources for communities interested in sustainable development activities.

- **Federal Emergency Management Agency,** http://www.fema.gov – includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.

- **American Planning Association,** http://www.planning.org – is a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.

- **Institute for Business and Home Safety,** http://ibhs.org – an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. Online resources provide information on natural hazards, community land use, and ways citizens can protect their property from damage.

State Resources

- **Alaska DHS&EM** is responsible for coordinating all aspects of emergency management for the State of Alaska. Public education is one of its identified main categories for mitigation efforts.

- Improving hazard mitigation technical assistance for local governments is a high priority item for the State of Alaska. Providing hazard mitigation training, current hazard information, and the facilitation of communication with other agencies would encourage local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their website at http://www.ak-prepared.com.

- **DCCED DCRA:** Provides training and technical assistance on all aspects of the National Flood Insurance Program (NFIP) and flood mitigation.

- **Division of Senior Services:** Provides special outreach services for seniors, including food, shelter, and clothing.

- **Division of Insurance:** Provides assistance in obtaining copies of policies and provides information regarding filing claims.

- **Department of Military and Veteran's Affairs:** Provides damage appraisals and settlements for Veterans Administration (VA)-insured homes, and assists with filing for survivor benefits.

Other Funding Sources and Resources

- **Real Estate Business.** Real estate disclosure is required by state law for properties within flood plains.

- **American Red Cross.** Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.

- **Crisis Counseling Program.** Provides grants to State and Borough mental health departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.

Local Resources

Shishmaref is a small community with a limited number of planning and land management tools. The resources available in these areas have been assessed by the City, and are summarized in the following tables.

Table 3. Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Comments (Year of most recent update; problems administering it, etc)
Building code	Y	
Zoning ordinance	N	
Subdivision ordinance or regulations	N	
Special purpose ordinances (floodplain management, stormwater management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Y	
Growth management ordinances (also called “smart growth” or anti-sprawl programs)	N	
Site plan review requirements	N	
Comprehensive plan	N	
A capital improvements plan	N	
An economic development plan	Yes	Local Economic Development Plan 2004-2009
An emergency response plan	N	
A post-disaster recovery plan	N	
Real estate disclosure requirements	N	

Table 4. Fiscal Capability

Staff/Personnel Resources	Y/N	Department/Agency and Position
City Manager	N	
City Planner	N	
Fire Chief	Y	Volunteer
City Clerk	Y	
Public Works Director	N	
Public Safety Director	N	
Librarian	N	
Fire Department	Y	Volunteer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	N	
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Y	Planning Committee
Floodplain Manager	Y	City Zoning Department
Surveyors	Y	City Zoning Department
Staff with education or expertise to assess the community's vulnerability to hazards	N	
Personnel skilled in GIS and/or HAZUS	Y	City Zoning Department
Scientists familiar with the hazards of the community	N	
Incident Commander	Y	Mayor
Grant Writers	Y	Native Village of Shishmaref
Environmental Advisory Council	N	Native Village of Shishmaref IGAP

Table 5. Administrative and Technical Capability

Financial Resources	Accessible or Eligible to Use (Yes or No)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority To Levy Taxes For Specific Purposes	No
Fees For Sewer/Water	Yes, cover operation costs
Impact fees for homebuyers or developers for new developments/homes	No
Incur Debt Through General Obligation Bonds	No
Incur Debt Through Special Tax And Revenue Bonds	No
Incur Debt Through Private Activity Bonds	No
Withhold Spending in Hazard-Prone Areas	Yes

Chapter 3. Risk Assessment

Requirements

> Section 201.6(c)(2) of the mitigation planning regulation requires local jurisdictions to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. (FEMA 386-8)

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, and disruption to local and regional economies, environmental damage and disruption, and the amount of public and private funds spent to assist with recovery.

Mitigation efforts begin with a comprehensive risk assessment. A risk assessment measures the potential loss from a disaster event caused by an existing hazard by evaluating the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards and their impact on community assets.

Federal Requirements for Risk Assessment

Federal regulations for hazard mitigation plans outlined in 44 CFR Section §201.6(c)(2) include a requirement for a risk assessment. This risk assessment requirement is intended to provide information that will help the community identify and prioritize mitigation activities that will prevent or reduce losses from the identified hazards. The federal criteria for risk assessments and information on how the Shishmaref MHMP meets those criteria are outlined below.

Table 6. Risk Assessment - Federal Requirements

Section §201.6(c)(2) Requirement	Where requirement is addressed in Shishmaref Multi-Hazard Mitigation Plan
Identifying Hazards §201.6(c)(2)(i) The risk assessment *shall* include a description of the type . . . of all natural hazards that can affect the jurisdiction . . .	Chapter 3, Section 1 identifies flood, erosion, severe weather, and earthquake as natural hazards in Shishmaref.
Profiling Hazards §201.6(c)(2)(i) The risk assessment *shall* include a description of the . . . location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	Chapter 3, Sections 3-7 are hazard-specific sections of the Shishmaref MHMP that profile the natural hazards that may affect the community. The Plan includes **location, extent** and **probability** for each natural hazard identified. The MHMP also provides hazard specific information on **past occurrences** of hazards events.

Section §201.6(c)(2) Requirement	Where requirement is addressed in Shishmaref Multi-Hazard Mitigation Plan
Assessing Vulnerability: Overview §201.6(c)(2)(i) The risk assessment *shall* include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.	Chapter 3, Sections 3-7 contain summaries of each hazard and its impact on the community.
Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii) The risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.	According to Alaska Repetitive Loss Data provided by DHS&EM, there are no repetitively damaged structures in Shishmaref. There are no repetitively damaged structures in the State of Alaska. Section 3 Flood explains this requirement in more detail.
Assessing Vulnerability: Identifying Structures §201.6(c)(2)(ii)(A) The plan *should* describe vulnerability in terms of the types and number of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.	Chapter 3, Section 2, Table 12 lists structures, infrastructure and critical facilities located in the identified hazard areas.
Assessing Vulnerability: Estimating Potential Losses §201.6(c)(2)(ii)(B) The plan *should* describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.	Chapter 3, Section 2, page 36, estimates potential dollar losses to facilities. This information was derived from a study by the USACE, "Section 117 Shoreline Erosion Protection, Shishmaref, Alaska."

Vulnerability Assessment Methodology

The purpose of a vulnerability assessment is to identify the assets of a community that are susceptible to damage should a hazard incident occur.

Critical facilities are described in the Community Profile Section of this hazard plan. A vulnerability matrix table of critical facilities as affected by each hazard is provided in Section 2 of this chapter.

Facilities were designated as critical if they are: (1) vulnerable due to the type of occupant (children or elderly for example); (2) critical to the community's ability to function (roads, power generation facilities, water treatment facilities, etc.); (3) have a historic value to the community (cemetery); or (4) critical to the community in the event of a hazard occurring (emergency shelter, etc.).

This hazard plan includes an inventory of critical facilities from Shishmaref records and land use maps.

The assessment includes the following seven sections:

Section 1. Identifying Hazards
Section 2. Assessing Vulnerability: Overview and Potential Losses
Section 3. Flood
Section 4. Erosion
Section 5. Severe Weather
Section 6. Earthquake
Section 7. Wildland Fire
Section 8. Hazards Not Present in Shishmaref

The description of each of the identified hazards includes a narrative and in some cases a map of the following information:

- The **location** or geographical areas in the community that would be affected.

  The location of identified hazards is described by a map wherever appropriate or in some cases with a narrative statement.

- The **extent** (i.e. magnitude or severity) of potential hazard events is determined.

  The following table is used to rank the extent of each hazard. Sources of information to determine the extent include the *Alaska All-Hazard Risk Mitigation Plan,* historical or past occurrences and information from the location of the hazard.

Table 7. Extent of Hazard Ranking

Magnitude/Severity	Criteria to Determine Extent
Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property severely damaged
Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least 2 week More than 25% of property is severely damaged
Limited	Injuries and/or illnesses do not result in permanent disability Complete shutdown of critical facilities for more than one week More than 10% of property is severely damaged
Negligible	Injuries and/or illnesses are treatable with first aid Minor quality of life lost Shutdown of critical facilities and services for 24 hours or more Less than 10% of property is severely damaged

- The **probability** of the likelihood that the hazard event would occur in an area.

  Table 8, taken from the *Alaska All-Hazard Risk Mitigation Plan,* categorizes the probability of a hazard occurring. Sources of information to determine the probability include the *Alaska All-Hazard Risk Mitigation Plan*, historical or past occurrences and information gathered through public meetings and stakeholder interviews.

Table 8. Probability Criteria Table

Probability	Criteria Used to Determine Probability
Low	Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.
Medium	Hazard is present with a moderate probability of occurrence with the next three years. Event has up to 1 in 3 year's chance of occurring.
High	Hazard is present with a high probability of occurrence within the calendar year. Event has up to 1 in 1 year chance of occurring.

- **Past occurrences** of hazard events.

  The past occurrences of natural events are described for identified natural hazards. The information was obtained from the *Alaska All-Hazard Risk Mitigation Plan,* State Disaster Cost Index, City records, other state and federal agency reports, newspaper articles, web searches, etc.

Section 1. Identifying Hazards

This section identifies and describes the hazards likely to affect Shishmaref. The community used the following sources to identify the hazards present in community: the *Alaska All-Hazard Risk Mitigation Plan*, interviews with experts and long-time residents, and past occurrences of events.

Alaska All-Hazard Risk Mitigation Plan, 2007 Matrices – Bering Strait (REAA)

Table 9 is taken from the *Alaska All-Hazard Risk Mitigation Plan* of October 2007. Data for the Previous Occurrences Matrix, Table 10, comes from the DHS&EM *Disaster Cost Index*, including data from 1978 to the 2007 and major events such as the 1964 earthquake. It may not include events known to the community or from other sources discussed in the sections describing specific hazards.

The Bering Strait REAA encompasses an extremely large area. Much of this area is quite different from Shishmaref and not all the hazards identified in Table 9 are relevant to Shishmaref. For example, avalanches are not a hazard present in Shishmaref as the terrain in the community is quite flat.

Table 9. Hazard Matrix

Hazard Matrix – Bering Strait (REAA)				
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**
Y	Y	Y-M	N	Y-M
Tsunami & Seiche	**Severe Weather**	**Ground Failure**	**Erosion**	**Drought**
N	Y-H	Y	Y	U

Hazard Identification:

Y: Hazard is present in jurisdiction but probability unknown

Y-L: Hazard is present with a low probability of occurrence within the next ten years. Event has up to 1 in 10 year's chance of occurring.

Y-M: Hazard is present with a moderate probability of occurrence within the next three years. Event has up to 1 in 3 year's chance of occurring.

Y-H: Hazard is present with a high probability of occurrence within the next one year. Event has up to 1 in 1 year chance of occurring.

N: Hazard is not present

U: Unknown if the hazard occurs in the jurisdiction

Source: Alaska All-Hazard Risk Mitigation Plan, 2007

Table 10. Previous Occurrences of Hazards 1978 to Present

Previous Occurrences – Bering Strait (REAA)				
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**
1 - L	3 - L	0	0	0
Tsunami & Seiche	**Severe Weather**	**Ground Failure**	**Erosion**	**Drought**
0	17 - L	0	1 - L	0

Extent

Z – Zero – Used for historical information. An event occurred but may not have caused damage or loss.

L – Limited – Minimal through maximum impact to part of community. *Falls short of the definition for total extent*.

T – Total – Impact encompasses the entire community.

Number:

Number of occurrences

Source: Alaska All-Hazard Risk Mitigation Plan, 2007

Identification of Natural Hazards Present in Shishmaref

Based on consultation with the Alaska DHS&EM, Table 9 and Table 10 from the *Alaska All-Hazard Risk Mitigation Plan*, Shishmaref plans and reports, and interviews, Shishmaref identified the following hazards to be profiled.

Table 11. Hazards Identification and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood	Yes	Designated as a hazard due to extensive history of flooding, and future vulnerability due to local topography.
Erosion	Yes	Designated as a hazard due to extensive history of erosion.
Earthquake	Yes	Designated as a hazard in Alaska *All-Hazard Risk Mitigation Plan*.
Volcano	No	Shishmaref is not located near any active volcanoes.
Avalanche	No	Shishmaref's topography is not one likely to produce avalanches.
Tsunami	No	Designated as not a hazard in *Alaska All-Hazard Risk Mitigation Plan*.
Severe Weather	Yes	Designated as a hazard due to extensive history of previous severe weather events.

Hazard	Yes/No	Decision to Profile Hazard
Ground Failure	Yes	Designated as a hazard in *Alaska All-Hazard Risk Mitigation Plan* and due to the unstable nature of permafrost.

See Section 7, Hazards not present in Shishmaref, for more information on the hazards not present in the community. Each hazard that is present in the community is profiled in hazard-specific sections.

Section 2. Assessing Vulnerability

Overview

The vulnerability overview section is a summary of Shishmaref's vulnerability to the hazards identified in Table 11. The summary includes the type of hazard, the types of structures, infrastructures and critical facilities affected by the hazards.

Identification of Assets

Because Shishmaref is a small community of 587 residents, every structure is essential to the sustainability and survivability of Shishmaref residents. Table 12 includes a list of facilities, utilities and businesses and their vulnerability to natural hazards.

Table 12. Shishmaref Asset Matrix - Structures and Infrastructure

Structure	Flood	Erosion	Earthquake	Severe Weather	Wildland Fire
Airport Road	H	M	L	H	L
AVEC Generator	L	L	L	H	L
BSSD School	M	M	L	H	L
Dump Road	H	M	L	H	L
FAA Maintenance Shelter	M	M	L	H	L
Fire Hall/Post Office	M	M	L	H	L
Friendship Center	M	M	L	H	L
Fuel Tank Farm	H	H	L	H	L
IRA Office	M	M	L	H	L
Landfill	H	M	L	H	L
Landing Strip	H	H	L	H	L
Mukluk Telephone	M	M	L	H	L
National Guard Armory	M	M	L	H	L
Sewage Lagoon	H	M	L	H	L
Shishmaref Lutheran Church	M	M	L	H	L
Shishmaref Tannery	H	H	L	H	L
SNC Building	M	M	L	H	L
SRB/DOT/FAA Facilities	M	M	L	H	L
Washeteria	H	M	L	H	L
Water Tank	H	M	L	H	L

Structure	Flood	Erosion	Earthquake	Severe Weather	Wildland Fire
Water Reservoir	M	M	L	H	L
Water Treatment Plant	H	M	L	H	L

H=High Vulnerability
M=Medium Vulnerability
L=Low Vulnerability

The following facilities were deemed critical by the City:

- Airport Road
- Dump Road
- Fire Hall/Post Office
- Friendship Center
- Fuel Tank Farm
- Landfill
- SRB/DOT/FAA Facilities
- Washerteria
- Water Reservoir
- Water Tank
- Water Treatment Plan

Detailed information concerning the replacement values of these facilities was not available. Following are estimates of the potential damages that could occur from erosion in Shishmaref according to the U.S. Army Corps of Engineers. "Section 117 Shoreline Erosion Protection, Shishmaref, Alaska" May, 2008:

- The number of residences lost over the 15-year model range from 23 to 81 with values around $4 million to $19 million.
- Commercial and public property damages are $ 3.4 million for the 15-year model and rise to almost $25 million under the faster erosion rate.
- The value of land lost over the 15-year model ranges from $26,000 to $68,000 using the Nome price per acre of $1,000. Land potentially lost ranges from 25 to 68 acres.
- Given the existing estimates for erosion, the sewage lagoons and landfill will likely need to be closed and cleaned up during the 15-year model; costing approximately $2 million.

Section 3. Flood

The following flood hazard profile includes a description of the hazard, the location, extent and probability of the hazard and past occurrences of flooding in Shishmaref.

Hazard Description

The primary flooding and erosion hazard in the Shishmaref is storm surge flooding. Shishmaref is located on a low-lying barrier island with a large portion of the community located below 50 feet of elevation and therefore susceptible to significant storm surge flooding. The effects of climate change are expected to add to natural hazards including flooding in coastal areas. As sea level rises and the offshore ice pack retreats, more coastal flooding can be expected.

Storm surge: Storm surges, or coastal floods, occur when the sea is driven inland above the high-tide level onto land that is normally dry. Often, heavy surf conditions driven by high winds accompany a storm surge adding to the destructive floodwater's force. The conditions that cause coastal floods also can cause significant shoreline erosion as the flood waters undercut roads and other structures. Storm surge is a leading cause of property damage in Alaska.

The meteorological parameters conducive to coastal flooding are low atmospheric pressure, strong winds (blowing directly onshore or along the shore with the shoreline to the right of the direction of the flow), and winds maintained from roughly the same direction over a long distance across the open ocean (fetch).

Communities that are situated on low-lying coastal lands with gradually sloping bathymetry near the shore and exposure to strong winds with a long fetch over the water are particularly susceptible to coastal flooding. Several communities and villages, including Shishmaref, along the Bristol Bay coast, the Bering Sea coast, the Arctic coast, and the Beaufort Sea coast have experienced significant damage from coastal floods over the past several decades. Most coastal flooding occurs during the late summer or early fall season in these locations. As shorefast ice forms along the coast before winter, the risk of coastal flooding abates.

Silent storm: Silent storms are a less severe form of storm surge flooding; resulting from high tides and winds. They occur quickly but are less destructive since they aren't accompanied by heavy surf.

Location

Shishmaref is located on a narrow, low-lying barrier island, the entire community is susceptible to significant storm surge and silent storm flooding.

Extent

Recently, the community experienced severe coastal storms that eroded the island of Sarichef to such an extent that the community itself is on the brink of destruction (U.S. Army Corps of Engineers, 2008). Flooding could have a **catastrophic** extent in Shishmaref as assessed by the criteria in Table 7. There is

the potential for multiple deaths, a complete shutdown of facilities for 30 days or more, and for more than half the property to be severely damaged.

Probability

Flooding is a **high** probability, as outlined in Table 8, with a high probability of occurring within the calendar year, up to a one in one year chance of occurrence. It is currently an ongoing problem and eventually will threaten the entire community unless mitigated.

Impact

Coastal storm surge flooding and the resulting erosion will, if not mitigated, require the relocation of the entire community (U.S. Army Corps of Engineers, 2008). The relocation would result in the loss of cultural resources.

Previous Occurrences

The following information is from the DHS&EM *Disaster Cost Index*, 2006.

03-201 Northwest Fall Sea Storm Declared October 23, 2002: Coastal storm surge flooding occurred in communities on the Northwestern coast of Alaska commencing on October, 8, 2002. A fall sea storm with 18 to 20-foot seas, extremely high winds, and strong tidal action caused severe damage. This storm was caused by a low pressure system moving down from the Arctic Ocean and settling over the Chuckchi Sea and the Kotzebue Sound resulting in widespread damage and coastal flooding, including damage to public roads and other public real property. The Governor declared a disaster for the cities of Kotzebue and Kivalina in the Northwest Arctic Borough. On November 6, 2002, an amendment was made to the original declaration to include the community of Shishmaref. The Northwest Arctic Borough (NWAB) provided funds to the City of Kotzebue ($10,000) and the City of Kivalina ($5,000). NWAB was provided a grant to reimburse funds given to those communities. Shishmaref did not have any eligible damage or expenses. The total for this disaster is $382K. This is only for Public Assistance totaling $344K for 4 potential applicants with 1 PW.

Community Participation in the NFIP

The City of Shishmaref participates in the National Flood Insurance Program. The function of the National Flood Insurance Program (NFIP) is to provide flood insurance at a reasonable cost to homes and businesses located in floodplains. In trade, the City of Shishmaref agreed to regulate new development and make substantial improvement to existing structures in the floodplain, or to build safely above flood heights to reduce future damage to new construction. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year) flood elevations.

Table 13 describes the FIRM zones.

Table 13. FIRM Zones

Firm Zone	Explanation
A	Areas of 100-year flood; base flood elevations and flood hazard not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.
C	Areas of minimal flooding.
D	Areas of undetermined, but possible, flood hazards.

Development permits for all new building construction, or substantial improvements, are required by the City in all A, AO, AH, A-numbered Zones. Flood insurance purchase may be required in flood zones A, AO, AH, A-numbered zones as a condition of loan or grant assistance. An Elevation Certificate is required as part of the development permit. The Elevation Certificate is a form published by the Federal Emergency Management Agency required to be maintained by communities participating in the NFIP. According to the NFIP, local governments maintain records of elevations for all new construction, or substantial improvements, in floodplains and to keep the certificates on file.

Elevation Certificates are used to:

- Record the elevation of the lowest floor of all newly constructed buildings, or substantial improvement, located in the floodplain.
- Determine the proper flood insurance rate for floodplain structures
- Local governments must insure that elevation certificates are filled out correctly for structures built in floodplains. Certificates must include:
- The location of the structure (tax parcel number, legal description and latitude and longitude) and use of the building.
- The Flood Insurance Rate Map panel number and date, community name and source of base flood elevation date.
- Information on the building's elevation.
- Signature of a licensed surveyor or engineer.

Floodplain mapping was completed for Shishmaref in August 2001. The north shore is located within a VE zone (areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action); coastal flood with velocity hazard (wave action); base flood elevations determined. The majority of the town site is located within an area determined to be outside 500-year floodplain. Flood hazard zones as delineated in the FIRM, are shown in Map 3 on page 41. Areas that the community reports are susceptible to flooding are shown on Map 4, on page 42.

Map 3. Flood Hazard Zones from FIRM

Map 4 Community Identified Hazard Areas

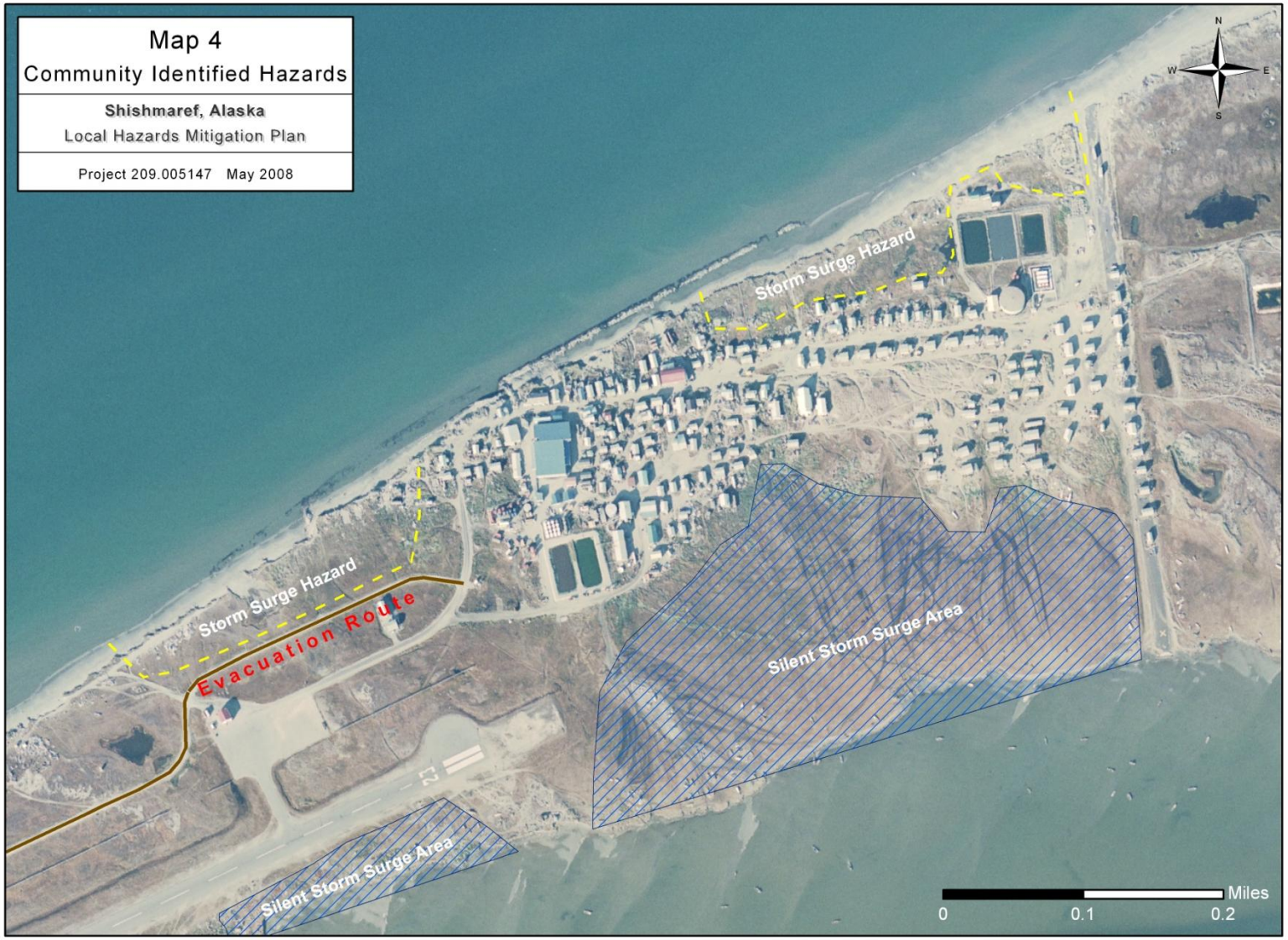


Table 14. NFIP Statistics

Emergency Program Date Identified	Regular Program Entry Date	Map Revision Date	NFIP Community Number	CRS Rating Number	Total # of Current Policies (10/13/09)
6/5/1988	8/23/2001	Prelim. 10/31/2008	020084	None	16
Total Premiums	**Total Loss Dollars Paid**	**Average Value of Loss**	**AK State # of Current Policies**	**AK State Total Premiums**	**AK Total Loss Dollars Paid**
$12,578	$133,490	$66,745	2,818	$2.2 million	$4.7 million
Shishmaref Average Premium	**AK State Average Premium**	**Repetitive Loss Claims**	**Dates of Rep. Losses**	**Total Rep. Loss**	**Average Rep. Loss**
$786	$796	0	0	0	0

Source: DCRA, DCA, Floodplain Management

Table 15. Housing Use Types in Shishmaref

Housing Types	Number of Structures
Total Housing Units	148
Occupied Housing (Households)	142
Vacant Housing	6
Vacant Due to Seasonal Use	4
Households located in the flood plain	

Table 16. Local and State Floodplain Coordinator Contact Information

Shishmaref Floodplain Coordinator	City Contact Person: Marjorie Weyiouanna, City Clerk Address: PO Box 83, Shishmaref, AK 99772 Phone: (907) 649-3781 Email: shhcityclerk@yahoo.com

State of AK Floodplain Coordinators	Floodplain Management Programs Coordinator Division of Community Advocacy Department of Commerce, Community & Economic Development Taunnie Boothby, State Floodplain Coordinator 550 W. 7th Avenue, Suite 1640 Anchorage, AK 99501 (907) 269-4567 (907) 269-4563 (fax) Email: taunnie_boothby@commerce.state.ak.us Web: http://www.commerce.state.ak.us/dca/nfip/nfip.htm

Repetitive Loss Properties

The risk assessment in all plans approved after October 1, 2008 must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

Under NFIP guidelines, repetitive loss structures include any currently insured building with two or more flood losses (occurring more than ten days apart) greater than $1,000 in any 10-year period since 1978.

States should provide communities with information on historic floods throughout the state so communities will know what type of damage has occurred (even if it didn't occur within that particular community).

States should ensure that lists of repetitive loss properties are kept up to date and that communities have the most current list. States should contact their FEMA Regional Office for this information.

FEMA also maintains a national list of properties that comprise the “Repetitive Loss Target Group”. These are repetitive loss properties that have either experienced four or more losses with the characteristics above, or have had losses that cumulatively exceed the property value of the building.

Repetitive loss properties are those with at least two losses in a rolling ten-year period and two losses that are at least ten days apart. Specific property information is confidential, but the State DCRA Floodplain Coordinator related that within the City of Shishmaref there have been **zero** properties that meet the FEMA definition of repetitive loss.

Current Mitigation Projects

Three projects have been constructed for erosion control and shoreline protection; the total cost was approximately $3.7 million. Construction of additional shoreline protection will be funded by several state and federal agencies. The DCCED is the lead agency for a 2009 legislative grant for a Shishmaref beach erosion project, with an estimated cost of $50,000. The USCOE secured additional funding through the 2008 Federal Supplemental Appropriation from Congress for construction of rock revetments at $10.5 million. The USCOE will also expend $500,000 on design work for additional revetment. The Immediate Action Workgroup (IAWG) recommends a $3 million request in FY2010 Governor’s budget to begin constructions of a revetment

Flood Mitigation Goals and Projects

Flood Goals

Goal 1. Reduce flood damage.

Goal 2. Prevent future flood damage.

Goal 3: Increase public awareness

Flood Projects

After receiving public input, it is the recommendation of this plan that the City of Shishmaref, along with other local, State and Federal entities look at the following project for flood control.

See Table 19. Mitigation Project Plan for further analysis of projects to mitigate flooding and erosion.

FLD-1. Develop Suite of Emergency Plans and Training/Drills (Goals 1, 2, 3)

Prepare a suite of emergency plans including Emergency Operations, Community Evacuation and Hazard Mitigation, along with training and conducting community drills to provide readiness in case of a flood.

FLD-2. Community Mitigation and Relocation Planning and Coordination (Goals 1, 2)

Coordinate with DCCED/DCRA to develop community mitigation and relocation plans.

FLD-3. ADOT/PF Preliminary Engineering & Early Coordination (Goals 1)

This study will examine the feasibility of a road from the island to the mainland. If constructed, this road would be used as an evacuation route and may be used in the relocation of the community.

FLD-4. Letter of Map Revision for Flood Insurance Rate Maps (Goals 1, 3)

FLD-5. Structure Elevation and/or Relocation (Goals 1, 2)

Relocate or elevate structures in immediate danger of flooding.

FLD-6. Update FIRM Shishmaref Maps (Goals 1, 2, 3)

Updated flood maps that delineate areas of flooding.

FLD-7. Pursue obtaining a Community Rating System (CRS) Rating (Goal 1, 2, 3)

The NFIP CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Obtaining a CRS rating may lower flood insurance rates.

FLD-8. Continue to obtain flood insurance for all City structures, and continue compliance with NFIP (Goals 1, 2)

FLD-9. Require that all new structures be constructed according to NFIP requirements and set back from the coastal shoreline to lessen future erosion concerns and costs (Goals 1, 2)

FLD-10. Public Education (Goals 1, 3)

Increase public knowledge about mitigation opportunities, floodplain functions, emergency service procedures, and potential hazards. This would include advising property owners, potential property owners, and visitors about the hazards. In addition, dissemination of a brochure or flyer on flood hazards in Shishmaref could be developed and distributed to all households.

FLD-11. Emergency Shelter Upgrades (Goals 1, 3)

The Shishmaref Lutheran Church is designated as an emergency shelter. The Church does not have a kitchen which may be required during an extended flooding event.

Section 4. Erosion

Hazard Description

Erosion is a process that involves the wearing away, transportation and movement of land. Erosion rates can vary significantly as erosion can result quickly from a flash flood, coastal storm, or other event, or quite slowly from long-term environmental changes. Erosion is a natural process but human activity exacerbates its effects.

Erosion in Shishmaref is primarily coastal erosion.

Coastal erosion: Coastal erosion is the wearing a way of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean, or the vertical down cutting along the shores of the Great Lakes. Erosion is considered a function of larger processes of shoreline change, which include erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is redeposited by the water body. Accretion results when more sediment is deposited along a particular shoreline than is lost. When these two processes are balanced, the shoreline is said to be stable. In assessing the erosion hazard, it is important to realize that there is a temporal, or time aspect, associated with the average rate at which a shoreline is either eroding or accreting. Over a long-term period (years), a shoreline is considered to be eroding, accreting or stable. A hazard evaluation should focus on the long-term erosion situation. However, in the short-term, it is important to understand that storms can erode a shoreline that is, over the long-term, classified as accreting, and vice versa.

Erosion is measured as a rate, with respect to either a linear retreat (i.e., feet of shoreline recession per year) or volumetric loss (i.e., cubic yards of eroded sediment per linear foot of shoreline frontage per year). Erosion rates are not uniform, and vary over time at any single location. Annual variations are the result of seasonal changes in wave action and water levels.

Erosion is caused by coastal storms and flood events; changes in the geometry of tidal inlets, river outlets, and bay entrances; man-made structures and human activities such as shore protection structures and dredging; long-term erosion; and local scour around buildings and other structures. Further information on coastal erosion can be found in FEMA-55, Coastal Construction Manual, FEMA's *Multi-hazard Identification and Risk Assessment, Evaluation of Erosion Hazards* published by The Heinz Center, and *Coastal Erosion Mapping and Management*, a special edition of the Journal of Coastal Research. (FEMA, 386-2)

Location

Shishmaref is located on a barrier island formed by frozen sandy soils which are susceptible to significant erosion. The primary erosion hazards are wave and slough erosion, sea ice gouging, and slumping resulting from melting permafrost. The entire community is susceptible to erosion.

Extent

Erosion could have a **catastrophic** extent in Shishmaref as assessed by the criteria in Table 7. There is the potential for multiple deaths, a complete shutdown of facilities for 30 days or more, and for more than half the property to be severely damaged.

Probability

The erosion of the north shore is a **high** probability, as outlined in Table 8. It is currently an ongoing problem and eventually will threaten the entire community unless mitigated.

The U.S. Army Corps of Engineers (USCOE) calculated two annual erosion rates. The low annual erosion rates are estimated to be between 2.7 to 13 feet per year; the high annual erosion rates are estimated between 8.9 to 22.6 feet per year (U.S. Army Corps of Engineers, 2008).

Impact

Erosion at the north shore will, if not mitigated, require the relocation of the entire community. Infrastructures including the community washeteria and sewage lagoon, located along the northeast shoreline, are in immediate danger. Relocation would result in the loss of cultural resources.

Previous Occurrences

The following information is from the DHS&EM Disaster Cost Index, 2006.

80 Shishmaref, August 5, 1988: In late July and early August, a series of intense windstorms with sea surges caused extensive damage to the seawall and erosion protection structure in the village of Shishmaref, leaving a number of critical public and private buildings subject to imminent damage. State disaster assistance provided funding to repair the damage.

98-186 Shishmaref Sea Storm: On October 6, 1997, under authority granted by the Alaska Statutes, Section 26.23.020, the Governor declared a condition existed in the City of Shishmaref to warrant a disaster declaration in order to provide for assistance. An unusually early sea storm caused severe damage resulting in homes being eroded into tidewater and being destroyed. Additional federal assistance under the Federal Emergency Management Agencies Flood Mitigation Assistance Grant in the amount of $600,000 was provided to complete the move of additional damaged structures. In addition the Alaska Housing Finance Corporation provided $200,000 in housing assistance for the match to the federal assistance. Individual Assistance totaled $16K for 6 applicants. Public Assistance totaled $1.2 million for 3 applicants and 14 DSR's. Hazard Mitigation totaled $50K. The total for this disaster is $1.46 million.

02-198 Shishmaref Seawall (Admin Order 194): Winds and high tides combined to strike the Shishmaref coastline from October 5 through October 7, 2001 and eroded inward as much as 50 feet. Some sections of the sand scarp were undercut as much as 16 to 20 feet due to the surf melting the underlying permafrost. In order to prevent further destruction of the coastline due to storms prior to tidewater freeze up, Governor Knowles issued Administrative Order No. 194 on October 27, 2001 which was not to exceed $110K (including DES administrative costs). These Public Assistance funds were to be used to

establish a sacrificial sandbag revetment to last through the storm season. The total for this incident is $87,858.74.

Current Mitigation Projects

Three projects have been constructed for erosion control and shoreline protection; the total cost was approximately $3.7 million. Construction of additional shoreline protection will be funded by several state and federal agencies. The DCCED is the lead agency for a 2009 legislative grant for a Shishmaref beach erosion project, with an estimated cost of $50,000. The USCOE secured additional funding through the 2008 Federal Supplemental Appropriation from Congress for construction of rock revetments at $10.5 million. The USCOE will also expend $500,000 on design work for additional revetment. The IAWG recommends a $3 million request in FY2010 Governor's budget to begin constructions of a revetment

Erosion Mitigation Goals and Projects

Erosion Goals

Goal 1. Reduce erosion damage.

Goal 2. Prevent future erosion damage.

Erosion Projects

ER 1: Revetment/Beach Erosion Control Project (Goals 1, 2)

Phase 1: 600 feet of rock revetment completed in September 2008

Phase 2: 750 feet of rock revetment under contract to be completed by October 2009

Phase 3: 550 feet of rock revetment under design in 2009; construction funding needed.

Phase 4: 1,225 feet to be surveyed in 2009; of this 325 feet will be new rock revetment and 900 feet will be raising existing revetments when funding is provided.

Section 5. Severe Weather

Hazard Description

Weather is the result of four main features: the sun, the planet's atmosphere, moisture, and the structure of the planet. Certain combinations can result in severe weather events that have the potential to become a disaster.

In Alaska, there is great potential for weather disasters. High winds can combine with loose snow to produce a blinding blizzard and wind chill temperatures to 75°F below zero. Extreme cold (-40°F to -60°F) and ice fog may last for weeks at a time. Heavy snow can impact the interior and is common along the southern coast. A quick thaw means certain flooding.

In many Alaskan communities, severe weather can disrupt the delivery of fuel by barge or aircraft. Since residents are generally dependent on diesel electric power for heat as well as energy needs, this can be disastrous to the community as a whole.

Weather issues in Shishmaref include extreme cold, winter storms, heavy snow, ice storms, fog, and drought.

Winter Storms

Winter storms originate as mid-latitude depressions or cyclonic weather systems. High winds, heavy snow, and cold temperatures usually accompany them. To develop, they require:

Cold air - Subfreezing temperatures (below 32ºF, 0ºC) in the clouds and/or near the ground to make snow and/or ice.

Moisture - The air must contain moisture in order to form clouds and precipitation.

Lift - A mechanism to raise the moist air to form the clouds and cause precipitation. Any or all of the following may provide lift:

- The flow of air up a mountainside.
- Fronts, where warm air collides with cold air and rises over the dome of cold air.
- Upper-level low-pressure troughs.

Heavy Snow

Heavy snow, generally more than 12 inches of accumulation in less than 24 hours, can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and major roadways are impacted, even closed completely, stopping the flow of supplies and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns. Injuries and deaths related to heavy

snow usually occur as a result of vehicle accidents. Casualties also occur due to overexertion while shoveling snow and hypothermia caused by overexposure to the cold weather.

Extreme Cold

What is considered an excessively cold temperature varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold". In Alaska, extreme cold usually involves temperatures below –40 degrees Fahrenheit. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

Extreme cold can bring transportation to a halt across interior for days or sometimes weeks at a time. Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access as well as the flow of supplies to northern villages. This can result from severe weather in the community or in hub locations from where air travel originates.

Extreme cold also interferes with a community's infrastructure. It causes fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters do not work, causing water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase disturbing buried pipes.

The greatest danger from extreme cold is its effect on people. Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening. Infants and elderly people are most susceptible. The risk of hypothermia due to exposure greatly increases during episodes of extreme cold, and carbon monoxide poisoning is possible as people use supplemental heating devices.

Ice Storms

The term ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. They can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages and personal injury. Ice storms result from the accumulation of freezing rain, which is rain that becomes super cooled and freezes upon impact with cold surfaces. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

Freezing rain develops as falling snow encounters a layer of warm air in the atmosphere deep enough for the snow to completely melt and become rain. As the rain continues to fall, it passes through a thin layer of cold air just above the earth's surface and cools to a temperature below freezing. The drops themselves do not freeze, but rather they become super cooled. When these super cooled drops strike the frozen ground, power lines, tree branches, etc., they instantly freeze.

Advection Fog

Advection fog is the result of condensation; occurring when warm moist air moves horizontally over a cold surface. Advection fog varies in depth from three feet to about 1,000 feet and is always found at ground level. This type of fog can reduce visibility to near zero (NOAA).

Unless equipped with an Instrumental Landing System, fog prevents aircraft from taking off or landing. Fog can be especially hazardous for light aircraft which often overfly the airfield to assess landing conditions.

The village of Shishmaref is often impacted by fog during the spring; when sea ice cools warm moist spring air creating a dense fog. Spring fog sometimes lasts a couple of day or even several weeks. The fog can prevent aircraft from landing and resupplying the village with food and other critical supplies.

Drought

Drought commonly occurs over a defined period of time of very low precipitation. Drought severity depends on duration, intensity, and geographic extent, as well as the demand on the water supply.

There are three ways to define drought:

1. Meteorological - a degree of dryness. Measures lack of actual precipitation compared to an expressed average.
2. Agricultural - defined as soil moisture deficiencies relative to what the plant life needs
3. Hydrological - relates to the effects of the lack of precipitation on streams, rivers, lakes, and groundwater levels.

A drought may result in a shortage of water for residential uses and increase wildland fire hazard.

Rain, snow and ice are the primary source of drinking water in Shishmaref. Small shallow ponds are also used for potable water. Sarichef Island's mean annual runoff quantities are approximately 200,000 to 300,000 gallons per acre; during drought years less than half of this amount may be available (Wheaton 1980), resulting in a shortage of drinking water for residents.

Location

The hazards of severe weather impact Shishmaref on an area-wide basis. A severe weather event would create an area-wide impact, damage structures, and potentially isolate Shishmaref from the rest of the state. Severe weather affecting regional transportation hubs (i.e. Nome and Kotzebue) also impacts Shishmaref, grounding flights and preventing the transportation of critical goods into the village.

Extent

Severe weather could result in a **critical** situation in Shishmaref. Injuries and/or illness could result from excessive snowfall, extreme cold, fog or drought causing shutdown of critical facilities, damage to property, water shortage and isolation of Shishmaref from mainland Alaska.

The *Alaska All-Hazard Risk Mitigation Plan, 2007* lists severe weather as creating one limited-damage event in Shishmaref.

Impact

Severe weather can cut off air access limiting medevac availability and access to goods and services, including groceries and medical supplies. A severe weather event would create an area wide impact and could damage structures and potentially isolate Shishmaref from the rest of the state.

Probability

The City Council and residents describe severe weather as a serious natural hazard risk in Shishmaref, due to snow, ice, high winds, fog and drought. As noted on the table below, Shishmaref has a high probability of severe weather, which is defined, as the hazard is present with a high probability of occurrence within the calendar year. Event has up to a 1 in 1 chance of occurring.

Previous Occurrences

The following table from the Western Regional Climate Center provides a weather summary for Tin City. Historic weather data is not available for Shishmaref but is available for nearby Tin City where weather conditions are comparable.

Table 17. Tin City Weather Summary

Station:(509249) TIN CITY															
From Year=1966 To Year=1985															
	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	7.9	-2.6	2.7	36	Jun-77	-33	28/1984	16.7	1979	-8.5	1970	0	29.3	30.4	18.2
February	-0.4	-10.2	-5.3	41	13/1970	-39	19/1984	10.4	1982	-24.8	1984	0	27.2	28.2	21.6
March	4.2	-6.1	-1	38	Oct-84	-41	Jun-70	15.2	1967	-16.5	1977	0	30.1	30.7	21.9
April	13.3	3.6	8.5	46	30/1967	-26	Oct-84	18.4	1981	-4	1984	0	27.4	29.6	13.3
May	30.6	23	26.8	56	29/1983	-6	Mar-84	31.7	1969	21.1	1971	0	19.2	28.4	0.2
June	42.8	34.2	38.4	74	28/1971	23	May-69	42.2	1981	33.8	1975	0	1.9	12.4	0
July	49.9	41.9	45.9	73	22/1968	32	Feb-76	50.1	1977	42	1973	0	0	0.4	0
August	48.9	42.2	45.6	69	Apr-67	31	31/1980	50	1974	41.8	1984	0	0	0.2	0
September	43.1	36.5	39.8	61	Jul-74	21	20/1975	44.8	1974	34.7	1975	0	1	6.6	0
October	30.6	24.4	27.5	49	Feb-79	-4	31/1982	31.4	1969	22.9	1970	0	18	26.8	0.1
November	19.8	11.6	15.7	43	29/1983	-18	30/1968	23.4	1978	5.2	1969	0	26.4	29.2	4.9
December	7.8	-1.8	3	40	20/1983	-31	30/1974	19.8	1983	-13.2	1974	0	29.2	30.6	20
Annual	**24.9**	**16.4**	**20.6**	**74**	**19710628**	**-41**	**19700306**	**24.8**	**1967**	**17.3**	**1976**	**0**	**209.7**	**253.3**	**100.2**
Winter	5.1	-4.9	0.1	41	19700213	-39	19840219	8.5	1979	-8.3	1976	0	85.7	89.1	59.8
Spring	16.1	6.8	11.4	56	19830529	-41	19700306	20.8	1967	4.5	1984	0	76.7	88.7	35.4
Summer	47.2	39.4	43.3	74	19710628	23	19690605	45.3	1982	40.9	1973	0	1.9	13	0
Fall	31.1	24.2	27.7	61	19740907	-18	19681130	30.6	1978	23.2	1975	0	45.4	62.5	5

Table Updated 09/17/2006, Source: Western Regional Climate Center, http://wrcc.dri.edu

Severe Weather Mitigation Goals and Projects

Severe Weather Goals

Goal 1: Mitigate the effects of severe weather by instituting programs that provide early warning and preparation.

Goal 2: Educate people about the dangers of severe weather and how to prepare.

Goal 3: Develop practical measures to warn in the event of a severe weather event.

Severe Weather Projects

SW 1: Storm Ready (Goals 1, 2, 3)

Research and consider instituting the National Weather Service program of *"Storm Ready"*.

Storm Ready is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather—from tornadoes to tsunamis. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

To be officially Storm Ready, a community must:

1. Establish a 24-hour warning point and emergency operations center.
2. Have more than one way to receive severe weather forecasts and warnings and to alert the public.
3. Create a system that monitors local weather conditions.
4. Promote the importance of public readiness through community seminars.
5. Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.
6. Demonstrate a capability to disseminate warnings.

Specific Storm Ready guidelines, examples, and applications also may be found on the Internet at: http://www.nws.noaa.gov/stormready.

SW2: Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc. (Goals 1, 2)

SW3: Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability. (Goals 1, 2)

SW4: Encourage weather resistant building construction materials and practices. (Goals 1, 2)

SW5: Install a City-wide warning sirens. (Goals 1, 2, 3)

SW6: Develop a policy with local mail and freight carriers to ensure groceries, medical supplies and other necessities are delivered before non-essential mail after periods of limited air service. (Goals 1, 2)

Section 6. Earthquakes

Hazard Description

Approximately 11 percent of the world's earthquakes occur in Alaska, making it one of the most seismically active regions in the world. Three of the ten largest quakes in the world since 1900 have occurred here. Earthquakes of magnitude 7 or greater occur in Alaska on average of about once a year; magnitude 8 earthquakes average about 14 years between events.

Most large earthquakes are caused by a sudden release of accumulated stresses between crustal plates that move against each other on the earth's surface. Some earthquakes occur along faults that lie within these plates. The dangers associated with earthquakes include ground shaking; surface faulting, ground failures, snow avalanches, seiches and tsunamis. The extent of damage is dependent on the magnitude of the quake, the geology of the area, distance from the epicenter and structure design and construction. A main goal of an earthquake hazard reduction program is to preserve lives through economical rehabilitation of existing structures and constructing safe new structures.

Ground shaking is due to the three main classes of seismic waves generated by an earthquake. Primary waves are the first ones felt, often as a sharp jolt. Shear or secondary waves are slower and usually have a side to side movement. They can be very damaging because structures are more vulnerable to horizontal than vertical motion.

Surface waves are the slowest, although they can carry the bulk of the energy in a large earthquake. The damage to buildings depends on how the specific characteristics of each incoming wave interact with the buildings' height, shape, and construction materials.

Earthquakes are usually measured in terms of their magnitude and intensity. Magnitude is related to the amount of energy released during an event while intensity refers to the effects on people and structures at a particular place. Earthquake magnitude is usually reported according to the standard Richter scale for small to moderate earthquakes.

Large earthquakes, like those that commonly occur in Alaska are reported according to the moment-magnitude scale because the standard Richter scale does not adequately represent the energy released by these large events.

Intensity is usually reported using the Modified Mercalli Intensity Scale. This scale has 12 categories ranging from not felt to total destruction. Different values can be recorded at different locations for the same event depending on local circumstances such as distance from the epicenter or building construction practices. Soil conditions are a major factor in determining an earthquake's intensity, as unconsolidated fill areas will have more damage than an area with shallow bedrock. Surface faulting is the differential movement of the two sides of a fault. There are three general types of faulting.

Strike-slip faults are where each side of the fault moves horizontally. Normal faults have one side dropping down relative to the other side. Thrust (reverse) faults have one side moving up and over the fault relative to the other side.

Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and course silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid.

Liquefaction causes three types of ground failures: lateral spreads, flow failures, and loss of bearing strength. In the 1964 earthquake, over 200 bridges were destroyed or damaged due to lateral spreads. Flow failures damaged the port facilities in Seward, Valdez and Whittier.

Similar ground failures can result from loss of strength in saturated clay soils, as occurred in several major landslides that were responsible for most of the earthquake damage in Anchorage in 1964. Other types of earthquake-induced ground failures include slumps and debris slides on steep slopes.

Location

Shishmaref is located north of the Kigluak and Bendeleben faults; however, it is unclear whether any seismic activity centers on these faults. An earthquake hazard event could potentially impact any part of Shishmaref. Since the community is dependent on air transportation for delivery of food, fuel, medical services, etc. airport facilities are of particular concern, both in Shishmaref and in the transportation hubs that serve the community.

Extent

The extent of an earthquake in Shishmaref would have a **limited** extent.

Table 7 uses the following criteria to determine the extent of possible damage: injuries and/or illnesses do not result in permanent disability, complete shutdown of critical facilities for more than one week; more than 10 percent of property is severely damaged.

Intensity is a subjective measure of the strength of the shaking experienced in an earthquake. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter.

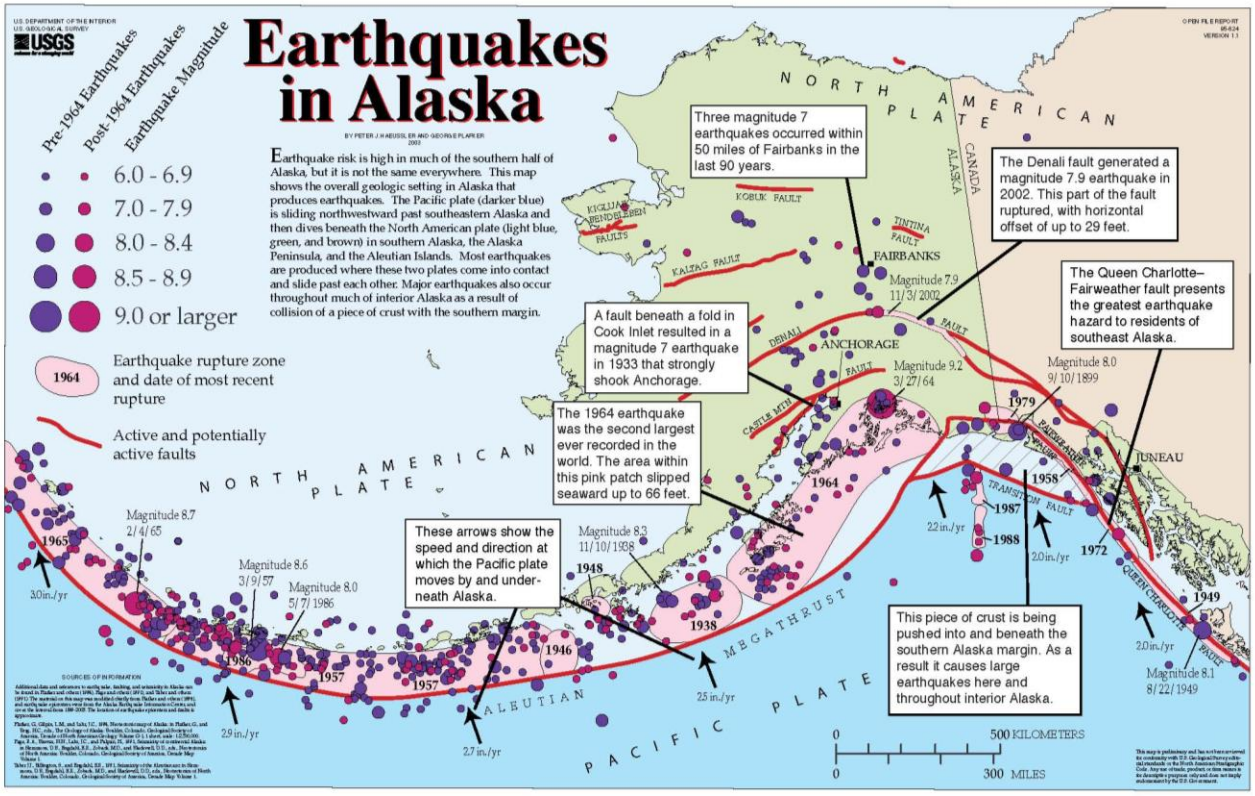
The "intensity" reported at different points generally decreases away from the earthquake epicenter. Local geologic conditions strongly influence the intensity of an earthquake; commonly, sites on soft ground or alluvium have intensities two to three units higher than sites on bedrock.

The Richter scale expresses magnitude as a decimal number. A 5.0 earthquake is a moderate event, 6.0 characterize a strong event, 7.0 is a major earthquake and a great earthquake exceeds 8.0. The scale is logarithmic and open-ended. (*Alaska All-Hazard Risk Mitigation Plan 2007*)

A magnitude of 2 or less is called a microearthquake, they cannot even be felt by people and are recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by seismographs all over the world. But the magnitude would have to be higher than 5 to be considered a moderate earthquake, and a large earthquake might be rated as magnitude 6 and major as 7. Great earthquakes (which occur once a year on average) have magnitudes of 8.0 or higher (British Columbia 1700, Chile 1960, Alaska 1964). The Richter Scale has no upper limit, but for the study of massive earthquakes the moment magnitude scale is used. The modified Mercalli Intensity Scale is used to describe earthquake effects on structures.

Figure 2 which show historic seismicity, also provides additional details of interest. The figures and other information at the Alaska Earthquake Information Center (AEIC) website list the Shishmaref area as having a low probability of an earthquake. However, since all of Alaska is at risk for an earthquake event Shishmaref could be at risk for an earthquake or have secondary impact from an earthquake in the region.

Figure 2. AEIS Historic Earthquakes in Alaska



Source: http://www.aeic.alaska.edu/html_docs/information_releases.html

Impact

The impact on the community of Shishmaref of a severe earthquake event occurring near the town site would be limited. The impact of a severe earthquake event impacting Nome, Fairbanks, or Anchorage (vital transportation hubs) could potentially have a greater impact on Shishmaref

Earthquake damage could be area-wide with potential damage to critical infrastructure up to and including the complete abandonment of key facilities. Limited building damage assessors are available in Shishmaref to determine structures integrity following earthquake damage. Priority would have to be given critical infrastructure to include: public safety facilities, health care facilities, shelters and potential shelters, and finally public utilities.

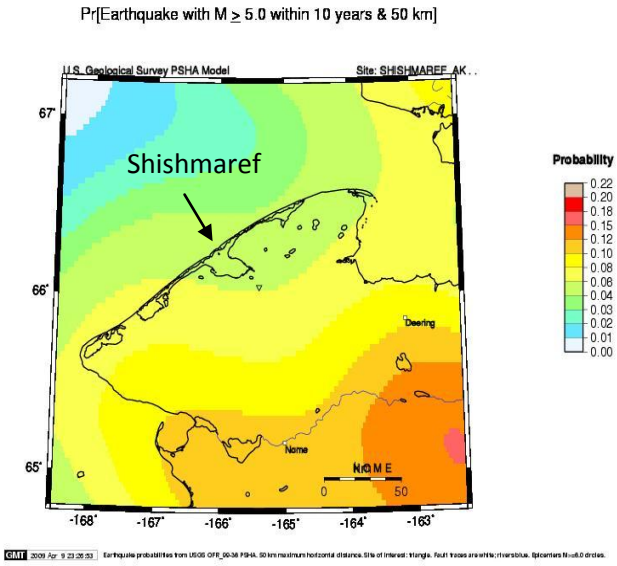
Probability

Shishmaref has a **low** probability of earthquake hazard. Table 8 lists the following criteria for a low probability: hazard is present with a low probability of occurrence with the next ten years. Event has up to 1 in 10 years chance of occurring.

While it is not possible to predict an earthquake, the U.S. Geological Survey (USGS) has developed Earthquake Probability Maps that use the most recent earthquake rate and probability models. These models are derived from earthquake rate, location and magnitude data from the USGS National Seismic Hazard Mapping Project.

Figure 3 indicates that the USGS earthquake probability model places the probability of an earthquake with an intensity of 5.0 or greater occurring within the next ten years within 50 kilometers (31 miles) of Shishmaref is three to four percent.

Figure 3. USGS Earthquake Probability Map



Previous Occurrences

There are no known previous occurrences of earthquakes in Shishmaref.

Earthquake Mitigation Goal and Projects

Earthquake Goals

Goal 1: Obtain funding to protect existing critical infrastructure from earthquake damage.

Earthquake Projects

E1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the City of Shishmaref. (Goal 1)

E2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event. (Goal 1)

E3. Contract a structural engineering firm to assess the identified buildings and facilities to determine their structural integrity and strategy to improve their earthquake resistance. (Goal 1)

E4. Assess facilities and improve earthquake preparedness through such measures as installing bookshelf tie-downs, improving computer servers' resistance to earthquakes, moving heavy objects to lower shelves, etc.

Section 7. Wildland Fire

Hazard Description

Wildland fires occur in every state in the country and Alaska is no exception. Each year, between 600 and 800 wildland fires, mostly between March and October, burn across Alaska causing extensive damage.

Fire is recognized as a critical feature of the natural history of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. In Alaska, the natural fire regime is characterized by a return interval of 50 to 200 years, depending on the vegetation type, topography and location. The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the fire management planning process and the full range of fire management activities is exercised in Alaska to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social consequences on firefighter and public safety and welfare, natural and cultural resources threatened, and the other values to be protected dictate the appropriate management response to the fire. Firefighter and public safety is always the first and overriding priority for all fire management activities.

Fires can be divided into the following categories:

Structure fires – originate in and burn a building, shelter or other structure.

Prescribed fires - ignited under predetermined conditions to meet specific objectives, to mitigate risks to people and their communities, and/or to restore and maintain healthy, diverse ecological systems.

Wildland fire - any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Use - a wildland fire functioning in its natural ecological role and fulfilling land management objectives.

Wildland-Urban Interface Fires - fires that burn within the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The potential exists in areas of wildland-urban interface for extremely dangerous and complex fire conditions, which pose a tremendous threat to public and firefighter safety.

Fuel, weather, and topography influence wildland fire behavior. Wildland fire behavior can be erratic and extreme causing firewhirls and firestorms that can endanger the lives of the firefighters trying to suppress the blaze. Fuel determines how much energy the fire releases, how quickly the fire spreads and how much effort is needed to contain the fire. Weather is the most variable factor. Temperature and humidity also affect fire behavior. High temperatures and low humidity encourage fire activity while low temperatures and high humidity help retard fire behavior. Wind affects the speed and direction of a fire. Topography directs the movement of air, which can also affect fire behavior. When the terrain funnels air, like what happens in a canyon, it can lead to faster spreading. Fire can also travel up slope quicker than it goes down.

Community members in Shishmaref stated wildland fires were a concern due to the close proximity of buildings. Fire could easily spread throughout the town site devastating the community. However, the saturated soil which characterizes the island often prevents wildland fires. During times of severe droughts the possibility of wildland fires exists; however, it is considered a low risk.

Location

The hazard of a wildland fire would impact Shishmaref's town site. Many structures within the community are situated very close together.

Extent

A structural fire event could result in a **critical** situation in Shishmaref. Injuries and/or illness could result from excessive smoke and damage the shutdown of critical facilities, damage to property and isolating Shishmaref from the mainland.

The *Alaska All-Hazard Risk Mitigation Plan, 2007* lists wildland fires as creating one limited-damage event in Shishmaref.

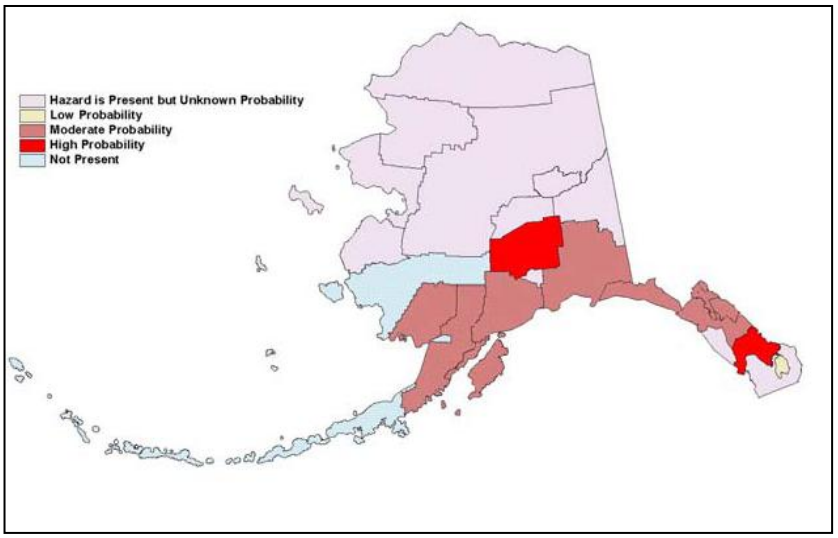
Impact

Shishmaref residents must be fairly self-reliant because of the community's remote location. A fire event could leave community residents homeless and damage critical structures. Fires could also cause severe air quality issue as the result of smoke.

Probability

The following map from the Alaska State Hazard Plan depicts Shishmaref as being in an area where wildland fire hazards are present but of an unknown probability.

Figure 4. Alaska All-Hazards Mitigation Plan - Fire Risk Map



Source: Alaska All-Hazard Risk Mitigation Plan, 2007

Previous Occurrences

There have been no reports of wildland fire damage in Shishmaref.

Wildland Fire Mitigation Goals and Projects

Wildland Fire Goals

Goal 1: Establish building regulations to mitigate against fire damage.

Goal 2: Conduct outreach activities to encourage the use of Fire Wise development techniques.

Goal 3: Standardize, repair and/or replace firefighting equipment.

Projects

WF1: Support the fire department with adequate firefighting equipment and training.

WF2: Promote Fire Wise building design, siting, and materials for construction.

WF3: Continue to enforce building codes and requirements for new construction.

WF4: Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property.

WF5: Encourage mitigation measures in the immediate vicinity of residential and business property.

Section 8. Description of Hazards Not Profiled in the 2009 Shishmaref MHMP

Avalanche

Alaska experiences many snow avalanches every year. The exact number is undeterminable as most occur in isolated areas and go unreported. Avalanches tend to occur repeatedly in localized areas and can sheer trees, cover communities and transportation routes, destroy buildings, and cause death. Alaska leads the nation in avalanche accidents per capita.

Avalanche Vulnerability Assessment

The terrain surrounding Shishmaref does not provide the necessary conditions for avalanche. No threat from avalanche is present on Shishmaref.

Ground Failure Hazard

Ground failure is a problem throughout Alaska with landslides presenting the greatest threat. Ground failure hazards exist to some degree in all areas of the state.

Landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). They are common all over the United States and its territories.

Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides occur as a result of rainstorms, earthquakes, volcanic eruptions, and various human activities.

Mudflows (or debris flows) are flows of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way.

Other types of landslides include: rock slides, slumps, mudslides, and earthflows. All of these differ in terms of content and flow.

Ground Failure Vulnerability Assessment

The terrain surrounding Shishmaref does not provide the necessary conditions for landslides or mudflows.

Tsunamis and Seiches

A ***tsunami*** is a series of ocean waves generated by any rapid large-scale disturbance of the seawater. These waves can travel at speeds of up to 600 miles per hour in the open ocean. Most tsunamis are

generated by earthquakes, but they may also be caused by volcanic eruptions, landslides (above or under sea in origin), undersea slumps, or meteor impacts.

Tsunami damage is a direct result of three factors:

1. *Inundation* (the extent to which the water covers the land)

2. *Wave action* that will impact structures and moving objects that become projectiles.

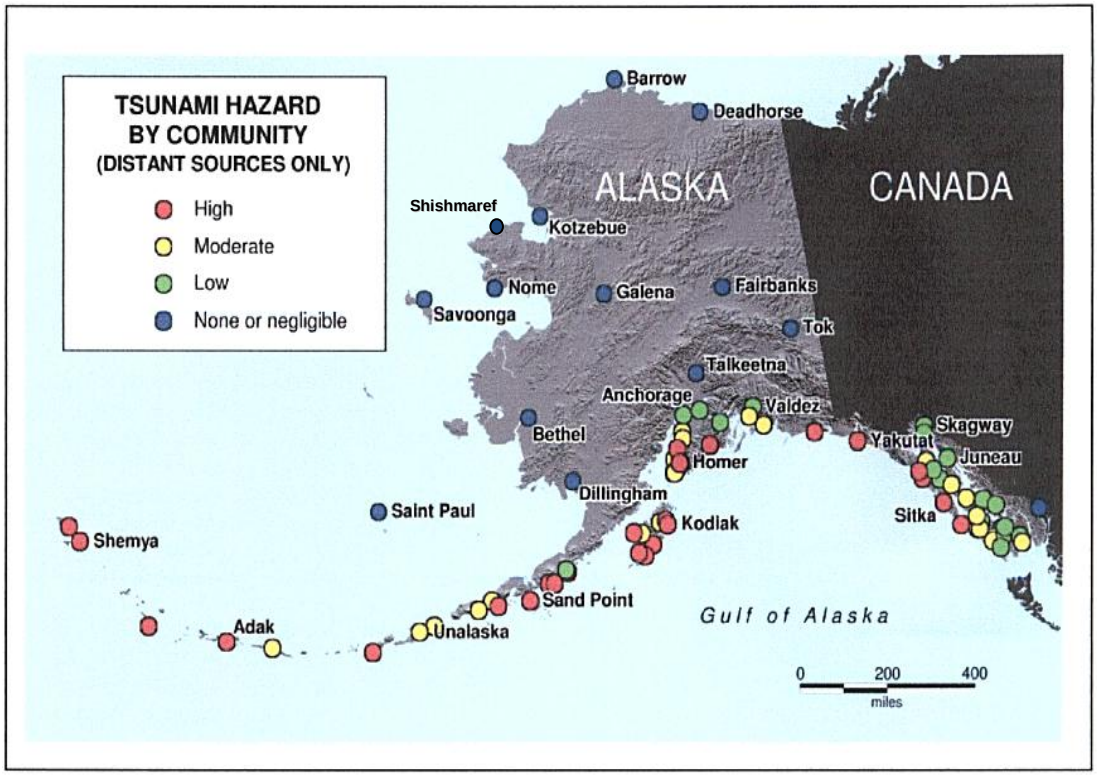
3. Coastal erosion

A ***seiche*** is a wave that oscillates in partially or totally enclosed bodies of water. They can last from a few minutes to a few hours as a result of an earthquake, underwater landslide, atmospheric disturbance or avalanche. The resulting effect is similar to bathtub water sloshing repeatedly from side to side. The reverberating water continually causes damage until the activity subsides. The factors for effective warning are similar to a local tsunami, in that the onset of the first wave can be a few minutes, giving

Tsunamis and Seiches Vulnerability Assessment

There is no danger of tsunamis and seiches since the topography of the Chukchi Sea and the Norton Sound do not allow tsunami to form and travel far enough toward the coast to threaten the community.

Figure 5. Tsunami Hazard by Community



Chapter 4. Mitigation Strategy

Benefit - Cost Review

This chapter outlines Shishmaref's overall strategy to reduce its vulnerability to the effects of the hazards studied. Currently the planning effort is limited to the hazards determined to be of the most concern; flooding, erosion, severe weather and earthquake; however, the mitigation strategy will be regularly updated as additional hazard information is added and new information becomes available.

The projects listed on Table 19, were prioritized using a listing of benefits and costs review method as described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Therefore, the most cost-effective actions for implementation will be pursued for funding first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

The City of Shishmaref considered the following factors in prioritizing the mitigation projects. Due to the dollar value associated with both life-safety and critical facilities, the prioritization strategy represents a special emphasis on benefit-cost review because the factors of life-safety and critical facilities steered the prioritization towards projects with likely good benefit-cost ratios.

Extent to which benefits are maximized when compared to the costs of the projects, the Benefit Cost Ratio must be 1.0 or greater.

1. Extent to which benefits are maximized when compared to the costs of the projects, the Benefit Cost Ratio must be 1.0 or greater.
2. Extent the project reduces risk to life-safety.
3. Project protects critical facilities or critical city functionality.

    A. Hazard probability.

    B. Hazard severity.

Other criteria that were used to developing the benefits – costs listing depicted in Table 18:

1. Vulnerability before and after Mitigation
    - Number of people affected by the hazard, areawide, or specific properties.
    - Areas affected (acreage) by the hazard
    - Number of properties affected by the hazard
    - Loss of use
    - Loss of life (number of people)
    - Injury (number of people)

2. List of Benefits
    - Risk reduction (immediate or medium time frame)
    - Other community goals or objectives achieved
    - Easy to implement
    - Funding available
    - Politically or socially acceptable
3. Costs
    - Construction cost
    - Programming cost
    - Long time frame to implement
    - Public or political opposition
    - Adverse environmental effects

This method supports the principle of benefit-cost review by using a process that demonstrates a special emphasis on maximization of benefits over costs. Projects that demonstrate benefits over costs and that can start immediately were given the highest priority. Projects that the costs somewhat exceed immediate benefit and that can start within five years (or before the next update) were given a description of medium priority, with a timeframe of one to five years. Projects that are very costly without known benefits, probably cannot be pursued during this plan cycle, but are important to keep as an action were given the lowest priority and designated as long term.

The Shishmaref City Council will hold another public meeting on the MHMP Update. The plan is subject to final Shishmaref City Council approval after pre-approval is obtained by DHS&EM.

After the MHMP Update has been approved, the projects must be evaluated using a Benefit-Cost Analysis (BCA) during the funding cycle for disaster mitigation funds from DHS&EM and FEMA.

A description of the BCA process follows. Briefly, BCA is the method by which the future benefits of a mitigation project are determined and compared to its cost. The result is a Benefit-Cost Ratio (BCR), which is derived from a project's total net benefits divided by its total cost. The BCR is a numerical expression of the cost-effectiveness of a project. Composite BCRs of 1.0 or greater have more benefits than costs, and are therefore cost-effective.

Benefit-Cost Review vs. Benefit-Cost Analysis (FEMA 386-5) states in part:

Benefit-Cost Review for mitigation planning differs from the benefit cost analysis (BCA) used for specific projects. BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action. To assess and demonstrate the cost-effectiveness of mitigation actions, FEMA has developed a suite of BCA software, including hazard-specific modules. The analysis determines whether a mitigation project is technically cost-effective. The principle behind the BCA is that the benefit of an action is a reduction in future damages.

DMA 2000 does not require hazard mitigation plans to include BCA's for specific projects,

Benefit-Cost Analysis

The following section is reproduced from a document prepared by FEMA, which demonstrates on how to perform a Benefit–Cost Analysis. The complete guidelines document, a benefit-cost analysis document and benefit-cost analysis technical assistance is available online http://www.fema.gov/government/grant/bca.

Facilitating BCA

Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training that simplify the process of preparing BCAs. FEMA has a suite of BCA software for a range of major natural hazards: earthquake, fire (wildland/urban interface fires), flood (riverine, coastal A-Zone, Coastal V-Zone), hurricane wind (and typhoon), and tornado.

Sometimes there is not enough technical data available to use the BCA software mentioned above. When this happens, or for other common, smaller-scale hazards or more localized hazards, BCAs can be done with the Frequency Damage Method (i.e., the Riverine Limited Data module), which is applicable to any natural hazard as long as a relationship can be established between how often natural hazard events occur and how much damage and losses occur as a result of the event. This approach can be used for coastal storms, windstorms, freezing, mud/landslides, severe ice storms, snow, tsunami, and volcano hazards.

Applicants and Sub-Applicants must use FEMA-approved methodologies and software to demonstrate the cost-effectiveness of their projects. This will ensure that the calculations and methods are standardized, facilitating the evaluation process. Alternative BCA software may also be used, but only if the FEMA Regional Office and FEMA Headquarters approve the software.

To assist Applicants and Sub-applicants, FEMA has prepared the *FEMA Mitigation BCA Toolkit* CD. This CD includes all of the FEMA BCA software, technical manuals, BC training courses, Data-Documentation Templates, and other supporting documentation and guidance.

The *Mitigation BCA Toolkit* CD is available free from FEMA Regional Offices or via the BC Helpline (at bchelpline@dhs.gov or toll free number at (866) 222-3580.

The BC Helpline is also available to provide BCA software, technical manuals, and other BCA reference materials as well as to provide technical support for BCA.

For further technical assistance, Applicants or Sub-Applicants may contact their State Mitigation Office, the FEMA Regional Office, or the BC Helpline. FEMA and the BC Helpline provide technical assistance regarding the preparation of a BCA.

Benefit – Costs Review Listing

Table 18 lists mitigation projects and their benefits, costs and prioritization.

Table 18. Benefit Cost Review Listing

Mitigation Projects	Benefits (pros)	Costs (cons)	High
Flood/Erosion (FLD)			
FLD-1. Develop Suite of Emergency Plans and Training/Drills	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available 1 – 5 years, or as needed. IAWG Recommendation	Staff time	High
FLD-2. Community Mitigation and Relocation Planning and Coordination	Life/Safety issue/Risk reduction Benefit the entire community State assistance available IAWG Recommendation	Staff time	High
FLD-3. ADOT/PF Preliminary Engineering & Early Coordination	Life/Safety issue/Risk reduction Benefit the entire community IAWG Recommendation	Expensive	High
FLD-4. Letter of Map Revision for Flood Insurance Rate Maps	No direct cost Benefit to city and private properties within floodplain.	Staff time	High
FLD-5. Structure Elevation and/or Relocation	Life/Safety project Benefit to government facilities and private properties.	Dollar cost unknown, >$50k 1 – 5 year implementation	Medium

Mitigation Projects	Benefits (pros)	Costs (cons)	High
FLD-6. Updated FIRM Shishmaref Maps	FEMA, PDM**, HMGP*** and State DCRA funding available. USCOE facilitated project. Can be started immediately.	Expensive, at least $100,000	High
FLD-7. Pursue obtaining a CRS Rating	High capability by city to do on an annual basis Will reduce NFIP insurance for entire community. <$1,000/year	Staff time.	High
FLD-8. Continue to obtain flood insurance for all City structures, and continue compliance with NFIP.	High capability by city to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx.$3,000/year.	Staff time	High
FLD-9. Require that all new structures be constructed according to NFIP requirements and set back from the river shoreline to lessen future erosion concerns and costs.	High capability by city to do on an annual basis. Public benefit to have public buildings insured through NFIP. Inexpensive, approx.$3,000/year.	Staff time	High
FLD-10. Public Education	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive	Staff time	High
FLD-11. Emergency Shelter Upgrade	Life/Safety issue Benefit to entire community	Expensive	Medium

Mitigation Projects	Benefits (pros)	Costs (cons)	High
Erosion (E)			
E-1. Beach Erosion Control Phase 3: 550 feet of rock revetment under design in 2009; construction funding needed. Phase 4: 1,225 feet to be surveyed in 2009; of this 325 feet will be new rock revetment and 900 feet will be raising existing revetments when funding is provided.	Life/Safety issue Risk reduction Benefit to entire community State assistance available	Expensive, at least $10,500,000	High
Severe Weather (SW)			
SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time	High
SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	High

Mitigation Projects	Benefits (pros)	Costs (cons)	High
SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	High
SW-4. Encourage weather resistant building construction materials and practices.	Risk and damage reduction. Benefit to entire community.	Would require ordinance change. Potential for increased staff time. Research into feasibility necessary. Political and public support not determined. 1 – 5 year implementation	Medium
SW-5. Install a City-wide warning sirens	Life/Safety issue Benefit to entire community	Expensive	Medium
SW-6. Develop a policy with local mail and freight carriers to ensure groceries, medical supplies and other necessities are delivered before non-essential mail after periods of limited air service.	Life/Safety issue Benefit to entire community Inexpensive	Staff time	High

Mitigation Projects	Benefits (pros)	Costs (cons)	High
Earthquake (EQ)			
EQ-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the City of Shishmaref.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	High
EQ-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be an annual event	Staff time	High
EQ-3. Contract a structural engineering firm to assess the identified buildings and facilities.	Benefit to entire community Risk reduction	Feasibility and need analysis needed. 1 – 5 years	Medium
EQ-4. Nonstructural mitigation projects	Inexpensive. Reduces property damage and reduces risk of injury from falling objects	Staff or volunteer time	High

Mitigation Projects	Benefits (pros)	Costs (cons)	High
Wildland Fire (WF)			
WF1: Support the fire department with adequate firefighting equipment and training.	Life/Safety issue Risk reduction Benefit to entire community	Dollar cost not determined. Staff time to research grants	Medium
WF2: Promote Fire Wise building design, siting, and materials for construction.	Life/Safety issue Risk reduction Benefit to entire community Annual project. State assistance available	Dollar cost not determined. Staff time to research grants	High
WF3: Continue to enforce building codes and requirements for new construction.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time	High
WF4: Enhance public awareness of potential risk to life and personal property. Encourage mitigation measures in the immediate vicinity of their property.	Life/Safety issue Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time	High
WF-5. Encourage mitigation measures in the immediate vicinity of residential and business property.	Life/Safety issue/Risk reduction Benefit to entire community Inexpensive State assistance available Could be implemented annually	Staff time	High

Mitigation Project Plan

Table 19 presents Shishmaref's strategy for mitigation of the natural hazards faced by the community and includes a brief description of the projects, lead agencies, costs, potential funding sources and an estimated timeframe for each project.

Table 19. Mitigation Project Plan

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
Flood (FLD)				
FLD -1. Develop Suite of Emergency Plans and Training/Drills	City State FEMA	$10,000+	PDM* USCOE	>1 year
FLD-2. Community Mitigation and Relocation Planning and Coordination	City State DCRA FEMA	$10,000+	City State PDM	>1 year
FLD-3. ADOT/PF Preliminary Engineering & Early Coordination	State	$10,000+	State	>1 year
FLD-4. Letter of Map Revision for Flood Insurance Rate Maps	City DCRA FEMA	Staff Time	City/State Budgets	Ongoing
FLD-5. Structure Elevation and/or Relocation	FEMA DHS&EM	N/A	PDM	>1 year
FLD-6. Updated FIRM Shishmaref Maps	DCRA	>$100,000	PDM	<1 year
FLD-7. Pursue obtaining a CRS rating to lower flood insurance rates.	City	Staff Time	City	<1 year

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
FLD-8. Continue to obtain flood insurance for all City structures, and continue compliance with NFIP.	City	$1,500	City	Ongoing
FLD-9. Require that all new structures be constructed according to NFIP requirements and set back from the river shoreline to lessen future erosion concerns and costs.	City	Staff Time	City Budget	Ongoing
FLD-10. Public Education	City DHS&EM	Staff Time	City	Ongoing
FLD-11. Emergency Shelter Upgrade	City	$5,000+	City	<5 years
Erosion (E)				
E-1 Beach Erosion Control Phase 3: 550 feet of rock revetment under design in 2009; construction funding needed. Phase 4: 1,225 feet to be surveyed in 2009; of this 325 feet will be new rock revetment and 900 feet will be raising existing revetments when funding is provided.	DCCED USCOE	$10,500,000	State USCOE	<5 years
Severe Weather (SW)				
SW-1. Research and consider instituting the National Weather Service program of *"Storm Ready"*.	City	Staff Time	City	<1 year
SW-2. Conduct special awareness activities, such as Winter Weather Awareness Week, Flood Awareness Week, etc.	City DCRA DHS&EM	Staff Time	City DCRA DHS&EM	<1 year

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
SW-3. Expand public awareness about NOAA Weather Radio for continuous weather broadcasts and warning tone alert capability	City	Staff Time	NOAA	Ongoing
SW-4. Encourage weather resistant building construction materials and practices.	City	Staff Time	City	<1 year
SW-5. Install a City-wide warning sirens	City	$10,000+	City	<5 years
SW-6. Develop a policy with local mail and freight carriers to ensure groceries, medical supplies and other necessities are delivered before non-essential mail after periods of limited air service.	City	Staff Time	City	<1 year
Earthquake (E)				
E-1. If funding is available, perform an engineering assessment of the earthquake vulnerability of each identified critical infrastructure owned by the City of Shishmaref.	City DHS&EM	To be determined	State Grants	>1 year
E-2. Identify buildings and facilities that must be able to remain operable during and following an earthquake event.	City DHS&EM DCRA	Staff Time	State Grants	>1 year
E-3. Contract a structural engineering firm to assess the identified buildings and facilities.	City DHS&EM	>$10,000	PDM	>5 years
E-4. Nonstructural mitigation projects	City/Tribe, DHS&EM	Staff Time, approximately $5k	PDM	1 year and ongoing

Mitigation Projects	Responsible Agency	Cost	Funding Sources	Estimated Timeframe
Wildland Fire				
WF-1. Support the fire department with adequate firefighting equipment and training.	DHS&EM, City/Tribe	To be determined	City/Tribe	1-5 years
WF-2. Promote Fire Wise building design, siting, and materials for construction.	DHS&EM, City/Tribe	Staff Time	City/Tribe	Ongoing
WF-3. Consider development of building codes and requirements for new construction.	DHS&EM, City/Tribe	Staff Time	City/Tribe	1 year
WF-4. Enhance public awareness of potential risk to life and personal property.	DHS&EM, City/Tribe	Staff Time	City/Tribe	1 year/ongoing
WF-5. Encourage mitigation measures in the immediate vicinity of residential and business property	DHS&EM, City/Tribe	Staff Time	City/Tribe	1 year/ongoing

*PDM = Pre-Disaster Mitigation Grant

Glossary of Terms

A-Zones

Type of zone found on all Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps (FBFMs).

Acquisition

Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.

Asset

Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood

A term used in the National Flood Insurance Program to indicate the minimum size of a flood. This information is used by a community as a basis for its floodplain management regulations. It is the level of a flood, which has a one-percent chance of occurring in any given year. Also known as a 100-year flood elevation or one-percent chance flood.

Base Flood Elevation (BFE)

The elevation for which there is a one-percent chance in any given year that floodwater levels will equal or exceed it. The BFE is determined by statistical analysis for each local area and designated on the Flood Insurance Rate Maps. It is also known as 100-year flood elevation.

Base Floodplain

The area that has a one percent chance of flooding (being inundated by flood waters) in any given year.

Building

A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Building Code

The regulations adopted by a local governing body setting forth standards for the construction, addition, modification, and repair of buildings and other structures for the purpose of protecting the health, safety, and general welfare of the public.

Community

Any state, area or political subdivision thereof, or any Indian tribe or tribal entity that has the authority to adopt and enforce statutes for areas within its jurisdiction.

Community Rating System (CRS)

The Community Rating System is a voluntary program that each municipality or county government can choose to participate in. The activities that are undertaken through CRS are awarded points. A community's points can earn people in their community a discount on their flood insurance premiums.

Critical Facility

Facilities that are critical to the health and welfare of the population and that are especially important during and after a hazard event. Critical facilities include, but are not limited to, shelters, hospitals, and fire stations.

Designated Floodway

The channel of a stream and that portion of the adjoining floodplain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.

Development

Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or of equipment or materials.

Digitize

To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse Mercator (UTM), or table coordinates) for use in computer

Disaster Mitigation Act (DMA)

DMA 2000 (public Law 106-390) is the latest legislation of 2000 (DMA 2000) to improve the planning process. It was signed into law on October 10, 2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Earthquake

A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.

Elevation

The raising of a structure to place it above flood waters on an extended support structure.

Emergency Operations Plan

A document that: describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated.

Erosion

The wearing away of the land surface by running water, wind, ice, or other geological agents.

Federal Disaster Declaration

The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended. Same meaning as a Presidential Disaster Declaration

Federal Emergency Management Agency (FEMA)

A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.

Flood

A general and temporary condition of partial or complete inundation of water over normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Disaster Assistance

Flood disaster assistance includes development of comprehensive preparedness and recovery plans, program capabilities, and organization of Federal agencies and of State and local governments to mitigate the adverse effects of disastrous floods. It may include maximum hazard reduction, avoidance, and mitigation measures, as well policies, procedures, and eligibility criteria for Federal grant or loan assistance to State and local governments, private organizations, or individuals as the result of the major disaster.

Flood Elevation

Elevation of the water surface above an establish datum (reference mark), e.g. National Geodetic Vertical Datum of 1929, North American Datum of 1988, or Mean Sea Level.

Flood Hazard

Flood Hazard is the potential for inundation and involves the risk of life, health, property, and natural value. Two reference base are commonly used: (1) For most situations, the Base Flood is that flood which has a one-percent chance of being exceeded in any given year (also known as the 100-year flood); (2) for critical actions, an activity for which a one-percent chance of flooding would be too great, at a minimum the base flood is that flood which has a 0.2 percent chance of being exceeded in any given year (also known as the 500-year flood).

Flood Insurance Rate Map

Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study

Flood Insurance Study or Flood Elevation Study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluations and determination of mudslide (i.e., mudflow) and/or flood-related' erosion hazards.

Floodplain

A "floodplain" is the lowland adjacent to a river, lake, or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood. The 100-year floodplain by the 100-year flood.

Floodplain Management

The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain Management Regulations

Floodplain Management Regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term

describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood Zones

Zones on the Flood Insurance Rate Map (FIRM) in which a Flood Insurance Study has established the risk premium insurance rates.

Flood Zone Symbols

A - Area of special flood hazard without water surface elevations determined.

A1-30 - AE Area of special flood hazard with water surface elevations determined.

AO - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet.

A-99 - Area of special flood hazard where enough progress has been made on a protective system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes.

AH - Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet and with water surface elevations determined.

B - X Area of moderate flood hazard.

C - X Area of minimal hazard.

D - Area of undetermined but possible flood hazard.

Geographic Information System (GIS)

A computer software application that relates physical features of the earth to a database that can be used for mapping and analysis.

Governing Body

The legislative body of a municipality that is the assembly of a borough or the council of a city.

Hazard

A source of potential danger or adverse condition. Hazards in the context of this plan will include naturally occurring events such as floods, earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard Event

A specific occurrence of a particular type of hazard.

Hazard Identification

The process of identifying hazards that threaten an area.

Hazard Mitigation

Any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. (44 CFR Subpart M 206.401)

Hazard Mitigation Grant Program

The program authorized under section 404 of the Stafford Act, which may provide funding for mitigation measures identified through the evaluation of natural hazards conducted under §322 of the Disaster Mitigation Act 2000.

Hazard Profile

A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

Hazard and Vulnerability Analysis

The identification and evaluation of all the hazards that potentially threaten a jurisdiction and analyzing them in the context of the jurisdiction to determine the degree of threat that is posed by each.

Mitigate

To cause something to become less harsh or hostile, to make less severe or painful.

Mitigation Plan

A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the State and includes a description of actions to minimize future vulnerability to hazards.

National Flood Insurance

The Federal program, created by an act of Congress in Program (NFIP) 1968 that makes flood insurance available in communities that enact satisfactory floodplain management regulations.

One Hundred (100)-Year

The flood elevation that has a one-percent chance of occurring in any given year. It is also known as the Base Flood.

Planning

The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Repetitive Loss Property

A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Risk

The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Riverine

Relating to, formed by, or resembling rivers (including tributaries), streams, creeks, brooks, etc.

Riverine Flooding

Flooding related to or caused by a river, stream, or tributary overflowing its banks due to excessive rainfall, snowmelt or ice.

Runoff

That portion of precipitation that is not intercepted by vegetation, absorbed by land surface, or evaporated, and thus flows overland into a depression, stream, lake, or ocean (runoff, called immediate subsurface runoff, also takes place in the upper layers of soil).

Seiche

An oscillating wave (also referred to as a seismic sea wave) in a partially or fully enclosed body of water. May be initiated by landslides, undersea landslides, long period seismic waves, wind and water waves, or a tsunami.

Seismicity

Describes the likelihood of an area being subject to earthquakes.

State Disaster Declaration

A disaster emergency shall be declared by executive order or proclamation of the Governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or that the disaster has been dealt with to the extent that emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation. Along with other provisions, this declaration allows the governor to utilize all available resources of the State as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation and destinations in connection with evacuation and control ingress and egress to and from disaster areas. It is required before a Presidential Disaster Declaration can be requested.

Topography

The contour of the land surface. The technique of graphically representing the exact physical features of a place or region on a map.

Tribal Government

A Federally recognized governing body of an Indian or Alaska native Tribe, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Tsunami

A sea wave produced by submarine earth movement or volcanic eruption with a sudden rise or fall of a section of the earth's crust under or near the ocean. A seismic disturbance or landslide can displace the water column, creating a rise or fall in the level of the ocean above. This rise or fall in sea level is the initial formation of a tsunami wave.

Vulnerability

Describes how exposed or susceptible to damage an asset it. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. The vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Other, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment

The extent of injury and damage that may result from hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Watercourse

A natural or artificial channel in which a flow of water occurs either continually or intermittently.

Watershed

An area that drains to a single point. In a natural basin, this is the area contributing flow to a given place or stream.

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7. *Shishmaref Economic Development Plan.* Prepared by Kawerak Incorporated for the City of Shishmaref. October, 2003.
8. University of Alaska, Fairbanks, and Alaska Earthquake Information Center website at: http://www.giseis.alaska.edu/Seis/
9. U.S. Army Corps of Engineers. "Section 117 Shoreline Erosion Protection, Shishmaref, Alaska." May, 2008.
10. USGS Earthquake Probability Mapping: www//eqint.cr.usgs.gov/eqprob/2002/index.php
11. Wheaton, Scott. *Ponds as Potable Water Sources.* Shishmaref: United States Public Health Service Environmental Health Branch, 1980.

Web Sites with General Hazard Planning Information

American Planning Association:	http://www.planning.org
Association of State Floodplain Managers:	http://www.floods.org
Developing the Implementation Strategy:	http://www.pro.gov.uk
FEMA: Mitigation Planning	http://www.fema.gov/fima/planning.shtm
Community Rating System:	http://www.fema.gov/nfip/crs.htm
Flood Mitigation Assistance Program:	http://www.fema.gov/fima/planfma.shtm
Hazard Mitigation Grant Program:	http://www.fema.gov/fima/hmgp
Individual Assistance Programs:	http://www.fema.gov/rrr/inassist.shtm
Interim Final Rule:	http://www.access.gpo.govl
National Flood Insurance Program:	http://www.fema.gov/nfip
Public Assistance Program:	http://www.fema.gov/rrr/pa

The Planning Process

The Disaster Mitigation Act of 2000 requires the plan to follow and record the following elements:

1. Planning process
2. Hazard Identification
3. Risk Assessment
4. Mitigation Strategy with Goals, Objectives and Actions
5. Plan Maintenance
6. Adoption by local government
7. Approval from FEMA, and the State Department of Homeland Security and Emergency Management

For more information on mitigation planning you can visit FEMA's website at http://www.fema.gov/plan/mitplanning/index.shtm

Local Hazards Mitigation Planning

Disasters, such as avalanches, coastal erosion, earthquakes, floods, high winds, landslides, tsunamis, wildfires, and severe weather, are events beyond human control. However, reducing the risks and damage from these events through mitigation efforts is possible.

The Federal Emergency Management Agency (FEMA) wants to ensure that each community's critical facilities and services will continue to function after a natural disaster. FEMA has funds available for projects that help to do this.

Preparing a Local Hazards Mitigation Plan (LHMP) is the first step in this process. Through the planning process, risks from each type of hazard are assessed, critical facilities are identified within the community and their vulnerability to hazard is determined, potential losses are estimated, and community land use is considered.

With this information, a mitigation strategy will be developed, including mitigation goals, objectives and actions to reduce or avoid long-term risk or damage from disaster events. Projects will be identified, evaluated and prioritized, and an implementation strategy developed.

The plan must be approved by the local government, FEMA, and the state Division of Homeland Security and Emergency Management (DHS&EM) before it is official.

Once the plan is finalized, the community is eligible to apply to FEMA and DHS&EM for funds for the community's identified mitigation projects.

State DHS&EM sponsors planning effort in Shishmaref

The Alaska Division of Homeland Security and Emergency Services has funded a local hazards mitigation plan for the Community of Shishmaref. WHPacific, Inc. and Bechtol Planning and Development (BP&D) have been hired to help the community to prepare the plan.

The LHMP will include information specific to Shishmaref, including critical facilities, potential threats from natural hazards, and strategies to minimize the risk to people and property.

Strategies may be for immediate implementation or long term activities, and can range from educating residents about what to do in the event of a natural disaster to relocating

Appendix A: Public Involvement

To Get Involved

The most practical plans are ones that have local public input. Your ideas are valuable to the planning team and to the usefulness of the plan.

A public presentation about the LHMP process is planned for Shishmaref on Tuesday, August 5, 2008 at 6 p.m. at the community hall. At this meeting planning team members will share information about the plan and its value to Shishmaref.

The team will also be meeting with people in the community to gather information about which facilities are critical to the community's well being and about previous occurrences of natural disasters in Shishmaref.

Your comments are welcome!

The planning team hopes that you will take an active role in the Shishmaref LHMP development. If you would like more information or have questions or comments, you can reach the planning team by phone or email:

Contact
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Further information may also be found on the DHS&EM website at:

http://www.ak-prepared.com/plans/mitigation/mitplanresourcesa.htm

Public Meeting

Date: August 5, 2008

Time: 6:00—8:00 pm

Location: Shishmaref Community Hall

Refreshments and Door Prizes!

Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

WHPacific

SHISHMAREF LOCAL HAZARDS MITIGATION PLAN
MEETING SIGN-IN SHEET

Name	Organization	Address	E-Mail
Rich Stasenko	City	Box 72066	rstasenko@gci.net
Angela Mike		P.O.Box 177 SHH,AK	
Neena Obruk			
Nathin mike			
Edwin J Weyiouanna	I.R.A, City Council		
Joey magby			
Fred D. Eningowuk	IRA City	Box 138 SHH.AK 72123	iragenera/@gci.net
[illegible]			
Jeremy Nayokpuk	✓		
[illegible]	✓	box 11 Shish AK	
Frank [illegible]	AVGC	Box 123 SHH, AK	

Amanda Olanna Bill Jones Sr IRA
Karen Kuzuguk Amelia Milligrock
Norman Olanna
Karla [illegible] IRA/City Howard P Weyiouanna Sr/City/IRA

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SHISHMAREF LOCAL HAZARDS MITIGATION PLAN
MEETING SIGN-IN SHEET

Name	Organization	Address	E-Mail
Esther Iyatunguk	City Council	Box 69 SHH,	
Florence Iyatunguk		Box 72014 Shish. Ak.	
Inez Iyatunguk		Box 72014 Shish. Ak.	
Donna Barr	Native Village of Shishmaref	Box 4 Shish. AK 99772	
Tara Fernandez			
Leonard Kuzuguk Jr			
Allison Nayokpuk		Box 31 shish AK 99772	
Cody Nayokpuk		Box 103 Shish AK 99772	
Stanley Tocktoo	Native Village of Shishmaref (IRA)	Box 128 Shishmaref AK	
Katherine Nayokpuk	SHH	Box 31	Knayokpuk@yahoo.com
Renee Kuzuguk			
Tammy Iyatunguk			
Robert C. Iyatunguk	Native Village of SHH	SHH, AK	
Tabitha D. Tickett			

Informational Meeting

When? Why? Where?

Shishmaref Friendship Center

May 13, 2009

7:00 pm

Multi-Hazard Mitigation Plan

Your questions, comments and input are welcomed!

This will be an informal meeting to talk about this planning project and its benefit to the community. All are welcome.

Come and provide input:

- What natural hazards threaten the community?
- What are the facilities that need to be preserved in case of a natural disaster?
- What projects could be done to make Shishmaref safer from natural disasters?

If you have questions contact:

Suzanne Taylor
WHPacific, Inc.
907.339.6570
staylor@whpacific.com

WHPacific

PUBLIC MEETING SIGN IN SHEET Friendship Center
may 13, 2009 7PM

1. Nellie & Weyiouanna Akaboo
2. Brice Eningowuk
3. Stanley Tocktoo
4. Curtis Nayokpuk - City
5. [illegible]
6. Howard Weyiouanna, City
7. Willa [illegible]
8. [illegible]
9. Johnson & Eningowuk
10. [illegible]
11. Karla Nayokpuk
12. Clarence Weyiouanna
13. Justin Schultze
14. Esther Ugatungnik City Council
15. Melanie Weyiouanna
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